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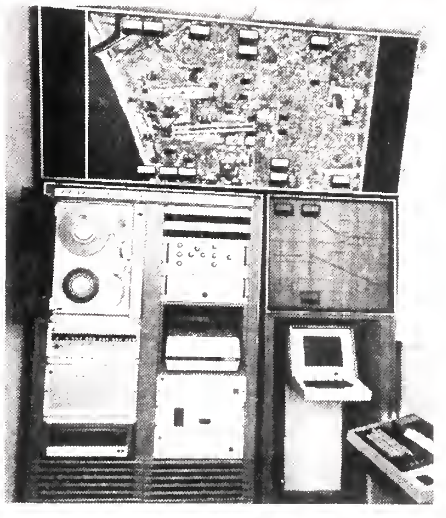

Booms Away

By Ann Dooley
Of the CW Staff

LOS ANGELES — Noise pollution is being studied and often reduced at several airports across the country using a computerized monitoring system that can separate jet aircraft noise from other noise.

Installed in communities bordering airports in San Diego, Los Angeles and Ontario, Calif., as well as in Hawaii and Washington, D.C., the systems rank the severity of aircraft noise in the area in comparison with other neighborhood sounds such as cars, trucks, lawn mowers and bark-

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Unsigned IBM Trial Paper Pops Up Again – Identified

By Edith Holmes
Of the CW Staff

NEW YORK — The U.S. antitrust case against IBM has always been a battle of papers — internal IBM papers.

Now, in one of the more puzzling aspects of the case, a new set of papers indicates IBM attorneys and executives may have known more about certain documents than they previously admitted in court.

The whole matter resembles a jigsaw puzzle and government attorneys are just now putting together the pieces of this particular part of the puzzle — even as their case goes into its final stages.

The flap started last Oct. 19, when government attorneys subpoenaed seven IBM executives to appear in court in order to identify certain unsigned documents taken from IBM files [CW, Oct. 25].

Such identification is important. IBM attorneys have argued the documents should not be given credence by the court unless the Justice Department can show who within IBM wrote them and who received them. Without such identification, they cannot be considered business records of the corporation.

The group never testified. Referring to one of the documents headed "Action," lead IBM counsel Thomas D. Barr told the judge and government attorneys that "none of [these] persons knows who wrote the document, wrote it, [illegible] ever saw it before to the best of their recollection."

Appearing outraged, Barr called the government's subpoena of the IBM executives "nothing more than a case of blackmail."

Shift of Scene

Almost two months later, on Dec. 20, the government again introduced documents. An IBM counsel identified one of them as having been written by J. J. Spector, IBM business practices [illegible].

[illegible] Hilary Law, then director of business practices and [illegible] IBM assistant treasurer, [illegible] the document by Spector [illegible] Spector worked for [illegible] at the time [illegible].

Both Law and Spector were among the seven executives in court on Oct. 19, but the new document did not connect them with the earlier document of which their attorneys claimed no knowledge.

Then, on June 8 of this year, Judge David N. Edelstein released certain documents to the government after stripping IBM's previous claim of "privilege."

In this group of documents there was a surprise — a six-page flip chart presentation which essentially included both of the earlier documents — the one identified as having been written by Spector and bearing Law's signature as well as the one that no one could previously identify.

The presentation, made on Dec. 9, 1968 to a meeting of IBM's general managers, is entitled "Share Measurements Change: Why and Action." The presentation was made by Law with the blessing of Frank T. Cary, now IBM chairman and then a senior vice-president and general manager of the DP group — and one of the IBM executives said to be unable to identify the Oct. 19 document.

Since one page of this new document is essentially the same as the one previously

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Plans Study, Quick Action

Carter Team Eyeing Federal DP Revamp

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. — Even DP has not escaped the scrutiny of Carter Administration officials looking for ways to streamline the government.

The President's Reorganization Project in the Office of Management and Budget (OMB) has begun a comprehensive examination of all federal DP procurement and management, according to project associate director Wayne G. Granquist.

"The management of federal DP resources is a significant factor in the delivery of governmental services and the operations of government," Granquist said in a recently circulated letter which noted that in this fiscal year the government "will spend over $4 billion and employ more than 150,000 people in the area of general-purpose DP."

At the same time, "there is a growing recognition these resources are not being acquired and managed in the most economic and efficient manner," Granquist said in asking for advice on the reorganization of federal DP resources from people both within and outside the government.

Thre is also concern that this technology "represents a threat to individual privacy," the government official added.

The study project, organized into half a dozen or more task forces, will focus on three basic areas, the director said:

- Improving productivity in the delivery of government services through the application of computer technology.
- Improving the acquisition, management and use of these resources.
- Eliminating duplication and overlap in agency jurisdictions dealing with computer questions.

With those objectives, the project also has three basic criteria, he added. It should be based on "careful and comprehensive analysis" and it should be conducted in a way that permits "the largest number of people" in and out of government to be involved.

Finally, it should be a "decision-forcing, action-oriented process," Granquist said.

In essence, Granquist's job in this and other reorganization efforts is "trying to capitalize the 'M' in OMB," he told the Interagency Committee on Automatic Data Processing when he addressed that group in June.

Granquist's letter invited addressees to submit comments to him on the "issues, problems and solutions" that should be considered by the project. He urged recipients to make copies of the letter for other persons and organizations "who might be interested in submitting separate responses."

Even without a copy of the letter, anyone with an interest in the management of the federal DP resources is welcome to send in comments, OMB noted. Although Gran-

(Continued on Page 6)

Justice Puts Brakes On FBI Switching, Plans Further Study

By Nancy French
Of the CW Staff

WASHINGTON, D.C. — The Justice Department has formally revoked a memorandum authorizing the Federal Bureau of Investigation (FBI) to develop a computerized message-switching system.

The system, which would serve but could also monitor the communications functions of state and local law enforcement agencies, was turned down by the Ford Administration as a threat to privacy and civil liberties. The message-switching plan brought cries of "Big Brother" from congressional critics who had hoped the plan was dead. However, the system surfaced again recently [CW, June 27].

The revocation came in a memorandum from Deputy Attorney General Peter F.

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Ifip Congress Next Month Set To Face Wide Variety of Issues

By E. Drake Lundell Jr.
Of the CW Staff

TORONTO — The world's most comprehensive program on important computer issues took place last month at the National Computer Conference, right?

Wrong.

The 1977 Congress sponsored by the International Federation for Information Processing (Ifip) here next month promises to earn that title with 108 technical sessions and 30 "mini" symposia on a wide variety of issues ranging from the forefront of technology to nitty-gritty data center management.

In addition, Ifip promises an in-depth examination of important social issues facing the computer community and society at large when the Congress meets Aug. 8-12.

All sessions will be available in English.

The effect of computers on employment will be highlighted in two of the social issues sessions. The first of these, chaired by [illegible] Brier of West Germany, will discuss the overall effects of the introduction of computers on the job market with speakers from the U.S., Denmark and Canada.

The second, under the direction of [illegible] Margulies of Austria, will delve into the "Impact of Computerization on Work Content and Job Satisfaction," with speakers from Denmark, Sweden and Hungary.

Most of the major countries in the Western industrialized world including the U.S., Canada, France and West Germany will be represented on another panel dealing with "the Social Accountability of Computing," which will be chaired by R. Kling of the

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Ifip to Face Wide-Ranging DP Issues

(Continued from Page 1)

United States.

"Is the Erosion of Privacy an Unavoidable Consequence of Computer Applications?" will be the question for a panel headed by F. Gallouedec-Genuys of France that will draw on expertise from Australia and Sweden.

The final session targeted for dealing with social issues will delve into the "Impact of Computerization on Leisure Activities" and will be chaired by H. Borko of the U.S. with participation from British, Danish and Canadian speakers.

Besides those five sessions specifically on social issues, several others will also touch on areas of societal concern, including "Safer Use of Computers," "Distributed Systems Operational and Privacy Requirements," "Economics, Organizational and Social Implications of Computer-Aided Design," "Systems for Public Planning and Control," "Models of the Environment" and "Data Bases, Business Systems and Privacy."

In addition to the social impact sessions, Ifip will also look into the crystal ball to help define the future of computing with such sessions as "Future Potentials in Computer Communication," "Data Networks Past, Present and Future," "Future of Data Management," "The Impact of Microcomputers on Computing," "Future Directions in Information Management" and "Future Directions in Computer Architecture."

Artificial Intelligence

There will be several sessions on the esoterica of artificial intelligence, but session organizer Y.D. Shmyglevsky of the Computer Center of the Academy of Science in Moscow noted the area may not be all that esoteric.

"There is a firm conviction among researchers that the 'human' style of user/-computer interaction, long envisioned by science fiction writers, will become a reality in the near fuure," Shmyglevsky stated.

In another area, Prof. Eric Manning of the University of Waterloo in Canada said the combination of computers and communications will make computer power as accessible as electricity.

"The same technology used for telephone lines, cable TV systems and space satellites now links computer terminals to remote computers and computers to each other. Telecommunications facilities already permit people to use computers across town, across the country and even in other countries.

"Great as their potential is, there are still many unresolved problems which the invited and contributed papers at the Congress will examine," Manning, who organized the communications section of the program, added.

In still another area, Prof. R.I. Tricker of the Oxford Center for Management Studies in England will focus on the impact of information systems on organizational thinking.

In a modern society, he said, information is increasingly connected with the exercise of power, but many existing information systems fail to respond to this challenge.

Looking beyond the technical and operational level, he said that management information is ultimately the outcome of human thought and that the information system designer now has the potential to contribute to the further evolution of his organization.

The conference program will also draw a large number of speakers looking into such topics as programming management, data base design, information systems development, modeling, program structure and specifications as well as other topics of interest to software developers and users.

Educators will also have a wide choice of sessions, ranging from ones on computer science programs to the use of computer-assisted instruction. Computer scientists will be treated to sessions ranging from finite elements and numerical analysis to the theory of data bases and programs.

The wide-ranging program, in which experts from more than 40 countries will participate, will feature 124 papers culled from 511 submitted for the program, in addition to 24 papers specifically requested from various experts in the industry worldwide.

Although it will be held on the North American continent for the first time since 1965, the Ifip program will be truly international in scope with speakers from — among others — the USSR, Japan, East and West Germany, Italy, France, Poland, Hungary, Sweden, Denmark, The Netherlands, the UK, Australia, Austria, Norway, Iran, India, Israel, Switzerland, Belgium, Finland, Nigeria, Hong Kong, Bulgaria and Mexico, as well as large U.S. and Canadian contingents.

Registration fees for the conference are $145. Forms and additional information can be obtained from the Organizing Committee for Ifip Congress 77, c/o Canadian Information Processing Society, Suite 214, 212 King St. West, Toronto, Ont., Canada M5H 1K5.

Room for Exhibits

TORONTO — While the International Federation for Information Processing's (Ifip) Congress 77 here next month promises an action-packed technical program, the exhibit space is still not sold out, and late starters still have a chance to join the 130 exhibitors already signed up for the show.

The 130 already participating will occupy approximately 260 booths, Ifip organizers said last week. There is room for 325 booths in the Sheraton Center exhibition hall here, the site for both the exhibit and technical sessions.

Information on exhibiting can be obtained from the Exhibits Manager, Ifip Congress 77, American Federation of Information Processing Societies, 210 Summit Ave., Montvale, N.J. 07645.

CDC Loses Account After IBM Testimony

NEW YORK — Control Data Corp. lost an $800,000 account with Sollac, a French firm, after one of the Minnesota-based company's employees testified at the U.S. vs. IBM antitrust trial recently [CW, June 27].

Although CDC sent a letter of apology to Sollac, for any embarrassment caused by the testimony of Gordon Brown, CDC's vice-president in charge of marketing and planning, the customer still decided to order IBM plug-compatible disk drives from Itel Corp.

Brown had testified that Sollac was reconsidering an order for a CDC disk drive after it learned IBM may soon be announcing an enhanced version of its 3350 disk drive.

Sollac was visited by IBM representatives as a result of the testimony, and the French DP manager complained to CDC that the preannouncement information was given to CDC in confidence.

In CDC's letter of apology, the company called the situation a result of an "erroneous interpretation" on its part.

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Anonymous IBM Trial Document Reappears — Identified Now

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identified as having been written by Spector, government attorneys have concluded the entire June 8 document was written by Spector or by Spector and Faw under the direction of Cary.

Crucial Documents

All of the documents concerned are important because they involve an internal IBM program called "Project Yardstick" that changed the way IBM collected market share statistics.

The government has contended that Yardstick — which was instituted after the firm knew it was under antitrust investigation — was designed to make IBM's share of the market look less monopolistic. The previous measurement system, accoridng to the government, showed IBM had market dominance.

The newly released six-page presentation document itself states the business, antitrust and legal reasons why IBM executives thought they needed to change the corporation's ways of measuring its share of the computer market.

Having told the Justice Department how to measure the market in the computer industry and what general scope of products should be included in that industry, the presentation pointed out that IBM's internal measurements did not agree with what the government had been told.

Records to Reflect Thoughts

"We must have our records reflect our thinking. We must not put IBM's executives in an untenable legal position relative to market share data in their files if they were to be called to testify in the future," the exhibit stated.

Furthermore, IBM's outside legal counsel had requested that the changes in share measurement be made, the document noted.

The fifth page of the presentation document — headed "Action" — suggested the elimination of "net position" in share measurements. The DP group should be responsible for implementing improved competitive measurements, and changes should apply to all components of the group, this page stated.

Some management personnel would be reluctant to make these changes, the document continued, noting the changes would make the IBM market share appear to go down.

The same day Faw made the presentation, Cary ordered the recommended changes to take place, effective in January 1969.

When Barr made his report to the court last October concerning the "action" documents and his and the seven IBM executives lack of knowledge about it, he stated: "There are many documents in the IBM Corporation headed 'Action.' There are a substantial number which I have seen in the last few days which have subject matters on them not terribly different, or somewhat similar, or vaguely related to the same subject matters on this sheet of paper.

"I do not know who wrote the document. I have looked very diligently," Barr added.

The IBM attorney then maintained the government could not offer the "Action" document as the view of IBM management and as an admission of the corporation and a business record without knowing who wrote it.

Lead government counsel Raymond M. Carlson responded last fall by stating that much of what Barr had told him about the document that day was exactly the kind of information the Justice Department sought.

IBM's claim of privilege for portions of many documents confused the government's receipt of them in the proper form and illustrated "the advantage to a corporate defendant of the tool of privilege to delay a trial proceeding," Carlson said then.

Barr, contacted about the apparent discrepancy just before press time, denied he now knows any more about the documents in question than he did last October.

Pointing out that he "didn't have the whole thing in my head," Barr said, "certainly if I knew of anything inconsistent with what I told the court I would have said so."

The inference that Spector wrote an entire document merely because he wrote one page of it is "kind of thin," he added.

Correction

The college curriculum described in "University Producing Grads 'Pretrained' in Business DP" [CW, May 2] is offered by the State University College at Buffalo and not by the State University of New York at Buffalo.

DP Buyer Charged With Kickbacks

NEW YORK — The U.S. Attorney's office in the southern district of New York has brought before a grand jury here its second case of kickbacks involving the purchase of computer paper supplies.

The jury indicted a former Pan American World Airways purchasing official, William Hasenstab, for allegedly receiving $45,000 in kickbacks from Tabulating Stock Forms, Inc. as a result of selecting that firm as a supplier for the past 11 years.

Hasenstab is scheduled to be arraigned July 14. No trial date has been set, according to John Wing, assistant U.S. attorney.

Tabulating Stock Forms was also named in the case involving Hartz Mountain Corp., in which a former Hartz official, Eugene Corey, received concurrent one-year prison sentences on [illegible]

[illegible]

ADR's Automated System Charter™ (ASC) Helps Mobil Oil Stay Ahead

Change at Mobil Oil's New York Headquarters DP Department is a way of life. Over 300 systems are in constant use. And this year 100 systems may be extensively changed and 20 new ones added. "Maintaining up-to-date, standardized systems documentation by hand would be nearly impossible," according to Client Services Supervisor, Jean-Louis Legrand.

ASC produces new documentation in minutes

Mr. Legrand recently helped Mobil Oil install ADR's Automated System Charter (ASC) as a primary tool for computerized documentation maintenance. By using ASC, Mobil has gained many advantages including the establishment of new and simpler standards for programmers. Each time there is a system change, the programmer describes the change on a form submitted through one of Mobil's Client Coordinators for entry into ASC. This results in an automatic documentation update which can be sent throughout the DP Department by printing out a completely new report, produced at only a fraction of the former cost. Reports which would have taken up to 4 days to organize and type manually are now produced in a few minutes—automatically, through ASC.

ASC lets Mobil run systems faster

ASC gives Mobil's Client Coordinator a comprehensive, uniform, and up-to-date tool containing all the instructions he needs to run a system. Because ASC automatically standardizes documentation, the Client Coordinator understands a system faster and can run even a new system after only a few hours of study.

"An important aspect of the ASC document is that it now contains a very clear definition of all the reports coming out of a system along with detailed instructions on how they are to be distributed," Mr. Legrand added.

Improved backup is important

ASC has enabled Mobil to record all system documentation on one tape, with JCL in one library and descriptive comments in another. By dumping these two libraries, Mobil has full backup of all or any part of their documentation. Any report can be reproduced in just a few minutes.

No longer any doubt about being up-to-date

"With ASC, being up-to-date is almost automatic. When changes recur, ASC gives our Client Coordinators the ability to quickly make a copy of the complete, updated document so that everyone can work with the latest information," said Mr. Legrand.

ASC improves system chart quality, cuts costs

"ASC has let us document a system in about half the man-hours we would have normally used. And we have the advantage that the results are more uniform and complete. We do not miss steps as we might in a manual report, and the system chart and program steps are always printed in the same way," Mr. Legrand concluded.

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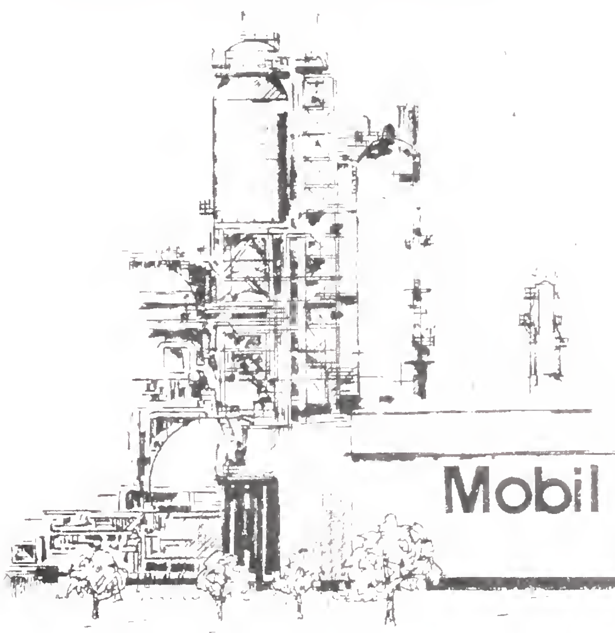

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Economist McAdams Has No Doubts: IBM Is a Monopoly

By Edith Holmes
Of the CW Staff

NEW YORK — IBM has monopoly power in the general-purpose digital computer system line of commerce — the corporation not only possesses the power to control prices in this market, it also has the power to exclude competition, according to Dr. Alan K. McAdams, chief economist on the U.S. government's trial team in its antitrust suit against IBM.

McAdams based his conclusions on the trial record and some 20 years of study of the computer industry throughout his graduate work at Stanford University's School of Business and now at Cornell University.

McAdams first became involved in U.S. vs. IBM in September 1971 when, as a senior staff economist with the President's Council of Economic Advisors, he was asked to determine whether there was any economic merit to the Justice Department's then-pending suit against the corporation.

Now on the stand as the government's summary witness with the task of tying together testimony and documents contained in the trial record, now over two years old and more than 53,000 pages long, McAdams said those companies that have been moderately successful in business DP have had to find "niches" in the marketplace where they could compete unperturbing to and therefore undisturbed by IBM.

Attempting a "formal assault" on IBM with a full line of equipment and services has not worked, McAdams said, citing IBM internal studies already in evidence.

Of the other mainframers in existence today, Honeywell is the only company that has successfully entered the business DP industry since the advent of computer technology without the benefit of a prior user base in products like accounting machines and tabulating equipment, he said.

Firms like Control Data Corp. and Digital Equipment Corp., for example, have won user acceptance in the scientific marketplace but have not done overwhelmingly well in marketing their machines for business applications, he contended.

'Opportunities to Fail'

To compete in business DP, a firm must market a combination of hardware, software, maintenance and service. This combination, in turn, must be capable of running a broad range of commercial applications, McAdams explained.

The firm must be prepared to lease its systems if it is to be an effective competitor in the marketplace. In addition, it must offer the user at least a promise of a compatible family of systems, the economist who helped government attorneys write the Justice Department's trial brief said.

"The industry offers multiple opportunities to fail," McAdams stated, referencing the testimony of executives from those firms which have exited from the business — notably General Electric (GE), RCA and Xerox. GE's and RCA's respective "full line approaches" and their failure indicates the wisdom of the niche market philosophy, McAdams suggested.

"If a market is truly competitive, both entry and exit are easy," the economist told Judge David N. Edelstein. The resources that GE, RCA, Xerox and Singer invested in the industry and the losses with which they left it suggest substantial barriers to entry, he contended.

All the measures that can be used to determine barriers to entry are indirect, McAdams cautioned. Among them, however, is IBM's own financial status.

IBM profits in the 1971-72 timeframe, the period most closely reviewed by McAdams, were unusually high compared with the rest of the economy and unusually stable, he said.

In addition, in 1976 IBM had a cash "hoard" of $6.1 billion and operating assets amounting to an annual return to cash flow of 50 cents on the dollar, McAdams testified.

Further, IBM uses conservative accounting practices and one of the most rapid forms of depreciation possible, he added, which helps to mask its true profitability.

Evolving Definition

Turning to the definition of "computer system" and how it has changed over the years as technology has evolved, McAdams told the court that between 1960 and 1965 it was possible for a firm to be an effective competitor by offering a single system of the small, medium and large varieties.

Systems in each size category did not have to be compatible then and rudimentary operating systems were considered useful but not required, he recalled.

Burroughs' work between 1965 and 1970 on its B5000 Master Control Program and IBM's promises for its 360 series announcement in 1964 made reasonably comprehensive operating systems and a family of software-compatible systems essential, according to McAdams.

From 1970 through today, this evolution of what constitutes a system has continued. Today manufacturers promise users that their systems operating software can handle various modes — batch, on-line, timesharing — simultaneously, he said.

Again citing IBM internal documents, McAdams stated that IBM announced the 360 prior to the time it conformed to IBM test procedures for announcement of a new product. The software for the family of compatible computers — OS/360 — hadn't even been specified when the announcement was made in April 1964.

IBM's actions in producing and marketing several members of the 360 family — particularly the 360/44, the 360/67 and the 360/90 — represented the corporation's efforts to create and defend its market share in the medium-scale scientific, time-sharing and prestige scientific markets respectively, according to McAdams. IBM's major motivation was not service to users, but the prevention of competitive inroads in these markets, he said.

With a performance in the range of the 360/50 and a price approximating that of the 360/30, the Model 44 was intended by IBM to blunt CDC's success in the medium-scale scientific market, for example, McAdams testified.

Not wishing to provide all its users with the price/performance ratio it offered this segment of the scientific marketplace, IBM designed the Model 44 to be incompatible with the rest of the 360 line so the machine would not attract the corporation's commercial or business DP users, the economist stated.

In addition, the 40 and 50 were high-profit machines, producing about 30% profit on revenue before taxes, while the 44 was planned to be very close to the break-even point, McAdams said. And the 44 cost IBM something to produce — with production facilities tight, every 44 made meant one less 40 or 50, he added.

Anti-Lessor Strategy

IBM treated its leasing company competition in a similar manner, changing the purchase/lease ratio on its 370 line to discourage the growth of leasing firms which bought up 360 CPUs and leased them to users for better-than-IBM prices, McAdams said.

IBM promoted the concept of risk leasing or rental of general-purpose computer systems and opposed an encroachment on that market by independent leasing companies because the system allowed IBM to retain "complete control of its property," he added.

"The viability of IBM's risk lease is dependent on price leadership and price control . . . by means of price leadership, IBM has established the value of DP usage," an internal IBM document written in November 1969 and used during McAdams' testimony said.

By retaining control over its machines which were out on lease, IBM could also maintain the value of DP usage, McAdams indicated. It controlled that value by such acts as "timing of new technology insertions; functional pricing; coordinated management of delivery; support services and inventory; refusal to market surplus used equipment; refusal to discount for age or for quantity; strategic location of function in boxes; 'solution selling' rather than hardware selling; [and] refusal to support subsequent use hardware," the IBM document said.

Leasing companies rose during the late '60s and, although they were in a sense still customers of IBM because they purchased systems, the manufacturer saw them as "insidious" because they reduced the number of rental customers available to IBM, a second IBM document said.

The average system life was extended by leasing companies because they kept a system out on lease longer than IBM would have offered it, which reduced activity in the market, McAdams said.

"IBM's ability to extract profit no matter where the customer moved was influenced," he added.

Effect of 370

Leasing company activity was strongest with the 360/65 and 50. When IBM announced its 370 series line in June 1970 (a year earlier than expected), the majority of equipment in the leasing company portfolios was obsoleted, McAdams said.

The 370 announcement was specifically made with "clear impact on competing firms," which included leasing companies, he testified.

McAdams referenced a Fortune magazine interview of several IBM executives at the time of the 370 announcement which quoted Thomas J. Watson, then chairman of the IBM board, as saying that most of the corporation's troubles in the marketplace were caused by leasing companies rather than the recession going on at that time.

The 370 was an undesirable market for leasing companies because it had a "significantly higher" purchase-to-lease multiplier and higher maintenance charges, which made operating leases undesirable to third-party lessors, McAdams said. The 370 also offered better price for performance to users by having faster peripherals and a larger memory capacity which were unavailable on the 360, he noted.

Leasing companies attempted to compete by increasing the capabilities of the 360 to equal that of the 370, he said. They found it was feasible to go beyond the "arbitrary" limits IBM had set on add-on memory for the 360, he added.

IBM, however, refused to maintain its systems that had memory over the limits it had prescribed which made a negative impression on potential users, he added.

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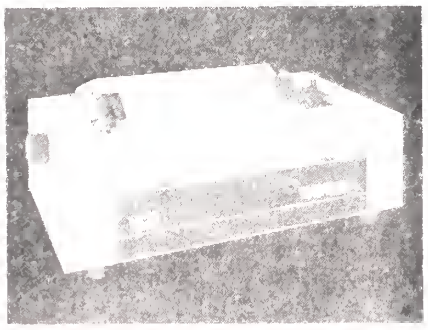

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Study Extraction Feasibility Methods

Minis Help Researchers Get Oil From Wyoming Shale

By John P. Hebert
Of the CW Staff

LARAMIE, Wyo. — Minicomputers are helping researchers here to develop methods of exploiting a virtually untapped energy resource: underground oil shale deposits.

Engineers and research scientists at the Laramie Energy Research Center (Lerc) here employed minicomputers as data collection devices last year in one of the first experiments to determine oil shale extraction feasibility methods.

The experiments, sponsored by the Energy Research and Development Administration (Erda), were aimed at finding ways to extract about 1.2 trillion barrels, or 50.4 trillion gallons, of the approximately 1.8 trillion barrels of oil believed to be in the shale in the Green River Formation of Colorado, Wyoming and Utah. Using conventional underground mining techniques only about 600 billion barrels of oil — or 21.3 gallons per ton — could be squeezed from the shale, according to Bruce Sudduth, project engineer for last year's Rock Springs Site 9 Retorting Experiment.

The Site 9 project concentrated on pumping a small part of the vast reserves in the Green River Formation that cannot be retrieved using the conventional "pillar" mining, Sudduth explained.

In some ways, Lerc failed in its efforts, Sudduth said. "The experiment was not very successful in terms of pumping large amounts of oil out of the ground. Out of a possible 2,000 barrels of oil, we recovered only 70 or 80 barrels," he said.

One of the main problems is that Lerc engineers were dealing with an unknown.

"We honestly don't know how to write good algorithms for this application . . . because we just don't know the composition of the resources," he said.

General Understanding

However, the experiment was successful in helping to determine how minicomputers can be better utilized as data collection devices in future retorting experiments, Sudduth said, and it also added to the general understanding of complex and unobservable underground conditions and reactions.

The Site 9 field experiment 200 miles northwest of Lerc headquarters entailed underground combustion (retorting) of the natural oil shale deposits and collection of product oil and fuel gases.

The project relied on a Hewlett-Packard Co. 9600 data acquisition and measurement system for temperature and pressure data acquisition and storage, real-time monitoring of certain experimental aspects, control of gas chromatographs, mathematical formulae computation and periodic summary outputs.

The 9600 was connected by cables to a 32K HP 2100 minicomputer located in a trailer adjacent to the well field. The 2100 system included an HP 7900 disk drive with 9.5M bytes of storage, an HP 7970 magnetic tape drive, paper tape reader and punch, HP systems for analog to digital conversion, and a crossbar scanner for multiplexing signals.

Computer Contributions

"One key advantage of the minicomputer systems was their capability to pull all the data in and store it on disk files for later analysis, at the field experiment site," Sudduth said.

Another important contribution of computer technology was evident during the ignition phase. The real-time capability of the system to monitor temperatures helped Lerc engineers to control power to a downhole electric heater and prevent heater damage, according to Sudduth.

Site 9 consisted of a center well used for initial ignition and afterwards for injection of air to sustain the underground combustion, four surrounding wells; four other production wells; and four observation wells drilled inside the test area, containing thermocouples at five levels down.

Each production well from the inner square was paired with one from the surrounding wells. The oil and gas outputs from the two were combined to feed a single demisting tower that removed oil mist from existing gases.

Lift pumps were used to pump oil from each production well. The main production well is a vertical shaft, 8-1/2 ft. in diameter. Air is injected and recycled in a process of spontaneous combustion to burn the carbons and retort the shale.

Gases Analyzed

An instrument room nearby was equipped with an HP 5830 gas chromatograph (GC) that was used to analyze gas samples piped from each production well pair.

Every 16 hours, bottled standard gas was fed to the GC for calibration purposes. The 2100 minicomputer controlled the injection of the samples, closure of the valves and collection of the GC voltage data.

The amounts of the various gaseous constituents were calculated for use in energy balance calculations to follow the progress of the underground reactions.

The instrument room also contained the manual backup system for the computer, which consisted of an array of strip chart recorders that read and plotted most of the temperatures and pressures as well as HP 2615 terminal and line printer.

An in-house-designed user program called Rascal assured that the minicomputer was easy to use while preventing users from "getting into the operating system and causing damage," an engineer explained.

R[illegible] use[illegible]

Accor[illegible] spec[illegible] HP [illegible] used in the [illegible] on the pro[illegible] more familiar [illegible] because HP offer[illegible] packages that are easy to interface with user-developed programs.

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Justice Revokes Go-Ahead for FBI Message Switching

(Continued from Page 1)

[illegible] FBI [illegible] Clarence M. Kel- [illegible] thoroughly reviewing [illegible] De- [illegible] with [illegible] whether [illegible] message [illegible] what [illegible] administered to pro- [illegible]

Retilling Same Ground

[illegible] Rep. Don Edwards (D-[illegible]) [illegible] of the House Judiciary [illegible] Subcommittee on [illegible] and [illegible] Rights is reported to be driving toward some resolution of the message-[illegible] hearings anti-[illegible]

The subcommittee is trying to construct [illegible] the FBI's National Crime [illegible] (NCIC) communica-[illegible] works, how it could work with [illegible] message-switching capabilities and [illegible] system could work outside of the aegis of the Federal government, a staff member said, acknowledging all this ground has been tilled before with expensive studies funded by the Law Enforcement Assistance Administration.

However, things may be different now. The Privacy Protection Study Commission, in its report due tomorrow or in its follow-up report due in September, will include the results of its investigation of the nation's criminal justice system. Those results will show the FBI and other federal law enforcement agencies are "pretty much unregulated," a source said.

This time, when Congress resumes efforts to draft legislation that would cover how criminal records may be used and how these agencies' activities should be limited to assure individual Constitutional rights, there will be some hard data that didn't exist before, the staffer predicted.

Edwards is also reportedly concerned that many states are influenced by the fact that the FBI message-switching service, like its fingerprint identification service, would be provided to the states as a "free service."

On the other hand, services from the National Law Enforcement Telecommunications System (Nlets), a nonprofit consortium operated by the states, come out of state law enforcement budgets. Certainly, the services provided by the FBI are no more free than those furnished by Nlets — they all come out of tax dollars, although the FBI doesn't like to hear people say that, a source remarked.

In its request for a go-ahead on message switching, the FBI attempted to separate the NCIC's Computerized Criminal History (CCH) records from the stolen property and warrants system and handle the non-CCH aspect first, even though the same technology would allow them to do both.

Some people on Capitol Hill are buying that argument, a source said. Some perceive message switching merely as a service function for state and local law enforcement much like fingerprint identification, and "there's no reason why the FBI or some neutral entity shouldn't have that function."

As the turmoil over message switching was beginning to quiet down, a two-day briefing was hosted by Chairman Edwards to acquaint new House members and staff with the law enforcement and computer jargon that surround the issues of message switching, computerized criminal histories and the like.

Deputy Attorney General Flaherty, in a mood of conciliation, attended the briefing along with representatives of the FBI, Nlets, the Justice Department Telecommunications Committee and representatives of criminal justice systems in California, Illinois and Florida.

Carter Administration Plans Federal DP Revamp

(Continued from Page 1)

quist asked for responses by July 15, "that obviously is not a hard-and-fast deadline," an agency spokesman acknowledged.

To stimulate participation, Granquist included with his letter a list of "previously identified" issues and problems as a guide to what he thinks are the project's basic concerns. But he noted the list "is by no means all-inclusive, so use or ignore [it] as you deem appropriate."

The list was, in fact, so general it suggested to some recipients that OMB has little idea what direction it should follow. Covering some 30 items, the list started with "data processing planning process" and "requirements planning," included "convergence of data processing and telecommunications" and ended with "functional performance specifications policy, Software Exchange Program, etc."

Quick Action Planned

While the study is intended to be broad in scope, it will be structured in a fashion that will permit pieces to be spun off and acted upon throughout the project, Granquist said. Some "high-priority problems, such as computer security policy and improved DP planning," are already being addressed in this way, he added.

As others are identified, "they will be given immediate attention. Throughout this project our goal will be to identify a problem or set of issues and create a task force to address them.

"As soon as each task force presents its recommendations — there will be strict deadlines for all groups — that group will be disbanded and implementation of its recommendations initiated," he continued.

Although the stimulus for setting up the task forces will come from the outside comments, membership of the task forces will be drawn largely from within OMB, the agency spokesman said.

Granquist expects the full study and initial implementation of its recommendations to be complete in 10 to 12 months, but one informed DP professional within the government called that estimate "at least optimistic" if the study's work is to be effective and substantial.

Even though he believes Granquist would be unable to get a lot done in a limited timeframe, the observer feels certain the effort to gain better control over the sprawling federal DP facilities is "a serious one and agencies better be ready for changes."

While the OMB spokesman admitted he had not spoken to Granquist specifically about the timetable, he said he was sure it was the project director's best estimate of the time needed to accomplish the work of the project as he currently envisions it.

Comments about the project can be addressed to Granquist at OMB in the Executive Office Building, Washington, D.C. 20503.

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Monitors Check Jet Noise Level

(Continued from Page 1)

ing dogs.

Using the data provided, airport investigators can determine what contribution aircraft are making to the overall noise level in a surrounding area.

The first system was installed in 1973 at the San Diego airport in accordance with a law passed by the state of California requiring noise monitoring at all airports. Airports outside California have installed them on a voluntary basis.

Although a state cannot penalize an airline or individual pilot for exceeding certain state-established noise levels, it can prescribe certain long-range guidelines.

Airports, in turn, are becoming more sensitive to the problem and increasingly have been changing flight plans and landing and take-off procedures to alleviate as much noise as possible.

Monitoring Equipment

The noise monitoring system uses remote microphone installations linked to a Varian Data Machines V71 minicomputer to perform calculations for a noise index. The index is continually being recorded, processed and compared with previous results, according to Varian officials.

The index is used by airport investigators to analyze cost-effectiveness of noise relief programs such as the two-segment landing approach. In this approach, the landing aircraft descends from a six-degree to a three-degree glide instead of a steady three-degree approach, according to a spokesman. In this way, the plane is able to fly higher and more quietly over residential areas near the airport.

The noise monitoring system has proven "very reliable," according to Walter Collins, noise abatement officer for both the Los Angeles and Ontario airports.

Right now the purpose of the system is not to use it as a tool for change, but only to identify certain levels of noise in order to establish impact areas, he said.

This year, the Los Angeles airport was told it was exceeding the criteria established by state law, so airport officials are trying to find different traffic patterns and other measures to reduce the noise.

However, "solutions are not always reachable economically," Collins said. While demands for noise reduction have increased, the standard of service demanded by the public has not decreased and a compromise can't always be reached, he added.

The noise-monitoring computer distinguishes between aircraft noise and other community noise by means of tracking and screening programs written by the EG&G Hydrospace-Challenger Group of San Diego. The programs take into account such factors as sound duration and the shape of the sound, meaning how it builds up and falls off. It also monitors the route of sound from each remote monitoring substation to the next.

Two separate noise-level tallies are kept by the computer. One is an account of the aircraft average noise level and the other is for the community average noise level, which includes all other noise.

The computer produces the noise-level averages for the community and the aircraft every hour at every site. In addition, daily, weekly and monthly noise-level totals are made. These figures have indicated that evening noise is more noticeable and annoying than noise at any other time. In addition, take-off sounds last longer than the noise from landings.

Individual aircraft can be identified by recordings of the actual noise picked up at a site and run through the system along with the tower-to-aircraft conversations identifying the flight number.

Remote monitoring system (RMS) operators may also listen to specific sites using a separate telephone line.

Fifty-four monitoring systems are used to perform data acquisition and processing, visual and audio display, identification of unusually loud noises from individual aircraft and data printout.

These RMS have weather-proof ceramic microphones mounted on specially designed poles and can communicate with the minicomputer located at the airport by leased phone lines.

Pacesetter for Europe?

Danes Get Privacy Bills Considered Mild

By G. Russell Pipe
Special to Computerworld

COPENHAGEN, Denmark — The Danish parliament is considering two bills to provide privacy protection for individually identifiable data. These regulations are the most limited privacy measures introduced so far in Europe.

Six years in preparation, one bill covers the private sector and the other, the public sector.

These government-sponsored proposals represent a significant departure from the Swedish, German and other European privacy proposals for a number of reasons.

First, the proposals outline different treatment for government and private industry. Second, the proposed regulatory commission is relatively weak compared with its European counterparts. Third, registration of systems rather than licensing has been proposed — but only in the private sector, and then sparingly for those organizations using personal records for management purposes.

Finally, the right of individuals to access their own files — a key feature of most European privacy measures and a key objective in international efforts to standardize privacy laws — is not a blanket requirement for Denmark's private sector.

Data Registration Board

Under the government-proposed scheme, a seven-member data registration board (DRB) with supporting staff would be created as an autonomous unit within the Ministry of Justice, to be appointed by the Minister.

Privacy rules for public agencies would pertain only to computerized systems and would govern maintenance, access and use of such records.

Under this design, the national government's privacy obligations would be essentially unsupervised except for a review of complaints and disputes by the Minister of Finance.

In the private sector, on the other hand, registration and supervision would be under the DRB's jurisdiction. Here, both computerized and manual files would be covered. However, scientific, statistical and archival data relating to individuals would be exempt.

Sensitive Data

Registration of personal data would not be necessary if it is "natural" or normal to the conduct of an organization's activities. That is, firms may maintain files on employees, clients and other individuals if they are essential to their internal operations and kept within the organization.

But files containing "sensitive" information such as race, religion, politics, sexual practices, health, criminal record, drug or alcoholic treatment must be registered. Personal information to be transferred between separate, unrelated organizations must be reported, and information older than five years may not be linked to other information, unless specifically approved.

No overall security requirements are outlined in either measure.

All data processing service bureaus — large and small — would be required to register with the DRB.

Direct mail services would be restricted to maintaining only the name, address, occupation and basic public record types of information about individuals. Sensitive characteristics would not be permitted to be recorded.

Local governments as well as private organizations would come under the DRB's jurisdiction. In the case of disputed decisions, the Minister of Finance would be empowered to resolve those brought by local governments. However, private organizations would have no appeal.

Board permission would be needed to transfer personal data outside Denmark. Government agencies may be granted one-time or case-by-case permission depending on the purposes to be served, according to the proposal.

Businesses registering their systems to comply with other provisions of the statute would have to ask permission to export personal data. This would be mandatory for sensitive data or when information is given to third parties.

There may be several reasons why the Danes are approaching privacy with much more reserve than did their Swedish neighbors, not the least of which is lack of public demand for the legislation.

Civil servants here have long enjoyed public confidence and are reluctant to impose rules implying lax procedures may exist. But since private enterprises are much more independent and less subject to regulation than in Sweden, separate public - private approaches were logical.

Because the present government faces a parliament which may seize on issues of cost and is generally antibureaucracy, it was felt that an essential minimum, and no more, should be proposed.

Denmark is a member of a score of international organizations which may deal with the harmonization or regulation of privacy security data movement issues.

Since Denmark is the only country to belong to all of them, whatever norms are established in Denmark may form the basis for negotiations among other countries.

The fact that Denmark has strayed so far from the scope of regulation in the other European countries in the modest authority invested in its DRB may make harmonizing the laws among the nations a more difficult task, especially for the Council of Europe.

'New Weapon'

STOCKHOLM — "One thousand data processing operators would be enough to close down most Swedish industry and government activities in Sweden," the *Dagens Nyheter* (Daily News) of Stockholm declared in banner headlines recently.

There are currently more than 5,000 DP programmers and operating personnel in Sweden, nearly all of whom are members of a single trade union. When a nationwide white-collar strike threatened in April, officials were warned by union representatives: "We are aware of this new weapon against employers."

The fact that most large companies and government agencies have automated major administrative files makes them increasingly dependent on computer personnel, *Dagens Nyheter* reported.

"Even absences over summer holidays could endanger reliable DP," it said.

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Cbema, ASQC Join Forces Opposing S. 825

By Molly Upton
Of the CW Staff

The [illegible] Business Equipment Manufacturers Association (Cbema) and the American Society for Quality Control (ASQC) [illegible] the opposition to S. 825, the Voluntary Standards and Accreditation Act of 1977 (see story on Page [illegible]).

Both decry the mandatory aspects of standards which the proposed National Standards Management Board (NSMB) would bring in replacing the voluntary aspects of the American National Standards Institute (Ansi).

The ASQC focused on the overlapping authority between various government agencies and predicted resultant confusion. The two opponents are secretariats of Ansi.

Cbema labeled the bill "premature and unwarranted," contending the "overall voluntary system of this country has operated successfully for over 75 years and is the basis on which the success of our industrial community has been built."

The ASQC claimed the bill would "replace the existing widely accepted Ansi system with an unknown, expensive, untried organization in federal government to perform identical duties."

S. 825 proposes a "confusing overlap of responsibilities" among the Federal Trade Commission, National Bureau of Standards (NBS) and the proposed NSMB, the ASQC noted.

The overlap "portends bureaucratic delay and mismanagement," according to the ASQC, which is a secretariat for Ansi's Z-1 committee on quality assurance.

ASQC's "experience in dealing with various federal agencies and departments would indicate a dismal future for such overlap in responsibility" as outlined in the bill.

In a letter to Sen. Edward M. Kennedy (D-Mass.), chairman of the Antitrust and Monopoly Subcommittee, and to members of the Senate Judiciary Committee, the ASQC outlined the three reasons it opposes the legislation.

"The present voluntary consensus standards system works as a fair and equitable arena for commercial product and service standards," according to the letter. "Any necessary improvements do not warrant and can be made without additional federal legislation."

Although S. 825 borrows many good provisions from the existing standards system, it offers "no new ideas toward the expeditious management of voluntary consensus standards," the ASQC continued.

The bill does offer federal dollars and a commitment to greater government participation — but "at a cost three times the annual budget of the existing private-sector system it would replace."

The association said "the private free enterprise system on which our country was founded will not long support a standards development system in which [the private sector has] practically no role in its rulemaking or management processes."

A better approach to federal involvement in standards is contained in the proposed Office of Management and Budget circular which encourages wide usage of voluntary standards by all federal agencies, the ASQC indicated.

For its part, Cbema observed in a statement that "the test of proper legislation is whether reasonable and enforceable safeguards are introduced in the standards-setting process without imposing excessive federal regulation."

Cbema is the secretariat for Ansi's X3 committee on computers and information processing and X4 committee on office machines and supplies.

"We think that S. 825 fails this test. Any modification of the standards program should ensure that there is no impediment to ingenuity and the development and implementation of new technology for industrial products" and "there is no ban to the free market choice of the consumer for any product."

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Calendar

Aug. 2-5, University of Waterloo, Waterloo, Ont. — **Third International Conference on Computing in the Humanities,** sponsored by the University of Montreal and the University of Waterloo. Contact: Prof. J.S. North, Department of English, University of Waterloo, Waterloo, Ont., Canada N2L 3G1.

Aug. 3-5, Boston, — **Conference for DP Trainers,** sponsored by Ware Associates. Contact: Ware Associates, 38 Main St., Hudson, Mass. 01749.

Aug. 4-6, Boston — **Personal Computing Fair,** sponsored by Boston University Summer Term. Contact: Jack Star, Personal Computing Fair, Boston University Summer Term, 725 Commonwealth Ave., Boston, Mass. 02215.

Aug. 7-11, Kansas City, Mo. — **15th Conference of the Urban and Regional Information Systems Association (Urisa).** Contact: Dr. Barry Wellar, Ministry of State for Urban Affairs, CMHC Buildings, Ottawa, Canada K1A 0P6.

Aug. 8-12, Toronto — **International Federation for Information Processing (Ifip) Congress 77.** Contact: Ifip Congress 77, C/O The Bowery Savings Bank, 110 E. 42nd St., New York, N.Y. 10017.

Aug. 8-10, Oklahoma City, Okla. — **Ninth Annual Meeting of the National Association for State Information Systems (Nasis).** Contact: Judie Parish, Administrative Assistant, Nasis, P.O. Box 11910, Lexington, Ky. 40511.

Aug. 10-12, San Francisco — **Institute for Software Engineering First National Conference.** Contact: Edward L. Prichard, Director, DP Authority, City of Portland-Multnomah County, 4747 E. Burnside, Portland, Ore. 97213.

Aug. 22-26, Boulder, Colo. — **Time and Frequency: Standards, Measurement, Usage,** sponsored by the National Bureau of Standards (NBS) Contact: Jeannette Detter, 277.06, NBS, Boulder, Colo. 80302.

Aug. 22-25, Cambridge, Mass. — **Fifth International Joint Conference on Artificial Intelligence.** Contact: Prof. Edward Fredkin, Local Arrangements Chairman, 545 Technology Sq., Cambridge, Mass. 02138.

Aug. 23-26, Bellaire, Mich. — **Parallel/-Distributed Conference** cosponsored by the IEEE Computer Society and the Department of Electrical and Computer Engineering at Wayne State, University. Contact: IEEE Computer Society, P.O. Box 639, Silver Spring, Md. 20901.

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As Part of NBS

Bill Would Create Federal Standards-Making Institute

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – A Senate bill that would create an independent government-financed standards board and a new Institute of Standards and Accreditation in the National Bureau of Standards (NBS) received strong support from the Computer & Communications Industry Association (CCIA) during hearings here recently.

However, equally strong opposition to the Voluntary Standards and Accreditation Act of 1977, S. 825, was lodged by the American National Standards Institute (Ansi).

The lack of computer industry standards costs the taxpayer "hundreds of millions of wasted dollars per year," CCIA President A.G.W. Biddle told the Senate Antitrust and Monopoly Subcommittee, chaired by the bill's author, Sen. James Abourezk (D.-S.Dak.).

Testifying on behalf of Ansi, the organization's executive vice-president, Donald I. Peyton, argued the bill would deprive the American public of the voluntary standards system by nationalizing it.

Ansi views the creation of the National Standards Management Board and the new NBS institute as its obvious replacement as the national standards-setter, Peyton said.

Rather than take the standards efforts in-house, the government should fairly enforce existing laws "which are totally adequate to provide oversight for voluntary activity," Peyton stated. Congress should encourage and support government participation in voluntary standards activities and government use of those voluntary standards which meet its needs, he added.

More FTC Responsibility

Besides establishing a standards board and an accreditation institute, the Abourezk bill would strengthen the Federal Trade Commission's (FTC) responsibility to see that standards are not used as anticompetitive tactics. This would be accomplished by providing a means of appealing FTC decisions where appropriate, a spokesman for the Senate subcommittee explained.

The Secretary of Commerce would be given overall responsibility for standards efforts. Through the proposed NBS institute, the Commerce Department could check out laboratories who come to it and ask to be accredited to test products for consumers and the government.

One of the assumptions of the bill is that testing facilities like Underwriters' Laboratories have become "the tools of the industries," he noted.

The NBS institute could develop standards in the absence of private initiatives, according to S. 825.

The bill further provides for U.S. government participation in international standards efforts.

Change of Heart

Jordan Baruch, assistant secretary for science and technology at the Department of Commerce, appeared briefly before the subcommittee to present executive branch opposition to the bill.

Abourezk, who had been informed by high-level Commerce Department officials that Baruch and the department as a whole supported S. 825, asked Baruch why his stance had changed. Staff members indicated the change was made on orders from the Office of Management and Budget (OMB).

Abourezk, who wanted to know Baruch's personal opinion about the bill, asked that he provide it, and Baruch said he would ask the White House for permission to do so.

Last week a subcommittee staff member indicated Baruch had provided his "qualified" approval of the bill without indicating why OMB had asked that he oppose it.

During the hearings, the CCIA's Biddle explained to subcommittee members that the lack of compatibility between mainframes makes it difficult for users to move easily from one manufacturer's system to another's.

There is no institutional mechanism to encourage voluntary private-sector standards bodies to act in any but their own self-interest, Biddle said, citing Ansi X-3 committee contributions regarding a standard to permit the interconnection of peripheral products to mainframes as an example.

The Computer and Business Equipment Manufacturers Association (Cbema) has served as the secretariat of Ansi X-3 for several years, and IBM is a key Cbema member, Biddle said in explaining the industry leader's potential for influencing any standards-making process.

"A mechanism must be developed and implemented to prioritize the development of those standards that will be most beneficial to users and to the nation," Biddle said. "In our industry we have numerous standards dealing with how a magnetic tape reel should be labeled, or physically specified, as well as standard numerical designations for cities.

"We do not, however, have standard higher level computer languages that permit a program written for one manufacturer's machine to be run without change on another's machine," he said. "Nor do we have standards for the efficient high-speed usage of computer communication networks or standards for the interconnection of the various units of hardware and software that go together to make a computer system.

The CCIA recommended Congress create a Computer & Communications Standards Board (CCSB), modeled after the Financial Accounting Standards Board (FASB), which would be under the full-time direction and control of a board of directors drawn from both the government and the private sector, including representatives from large and small providers and users.

The CCIA also proposed an addition to S. 825 which would require that standards be developed for the interconnection of devices made by different manufacturers.

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A special report on *Minicomputers and Small Systems* in the August 29th *Computerworld.*

Minis are now functioning at every level of business and industry, and *Computerworld's* August 29th special report, edited by Esther Surden, will focus on several issues that are currently the subject of widespread discussion and debate in the minicomputer field. We'll also cover minicomputer hardware in depth — including microcomputers being used in data processing systems. In all, you'll see a variety of applications stories and tutorials on topics like these:

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- How to evaluate technical evaluations — a look at what benchmark tests and product specifications mean.
- The evaluation and selection process — a case study.
- Minicomputer maintenance — analysis of possible methods (vendor maintenance, independent service organizations, and end user self-support) with an eye to cost savings.
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Contu Researcher Asks Help

How Effective Is Your Software Protection?

The National Commission on New Technological Uses of Copyrighted Works (Contu) was established to consider problems related to the reproduction and use of copyrighted works on DP systems, among other things. To do this, it has contracted with various research firms to gather data in specific areas of interest.

One of these firms has turned to Computerworld, *and particularly the software developers or vendors among our readers, for help.*

Harbridge House developed the following questionnaire to accumulate statistics, rather than folklore, on what forms of protection are being used for software and how effective that protection is.

CW has been assured (by Harbridge House) that information provided by readers will be treated as confidential, not going forward in the company's report to Contu nor in a summary report of the results with which the researchers will provide CW.

The completed questionnaire should be sent to Richard I. Miller, Harbridge House, Inc., 11 Arlington St., Boston, Mass. 02116.

Contu Questionnaire

(Please Use 1976 for All "Annually" Based Questions)

1. Name of Company ______________________________

   Address ______________________________

   Respondent's Name, Phone No. and Company Position

   ____

2. Please list the three major services/products provided by your company, indicating also the percent of annual sales each represents.

   1. ________________ % annual sales __________
   2. ________________ % annual sales __________
   3. ________________ % annual sales __________

3. How many employees does your company have? ________________

4. What are the total annual sales of your company? $________________

5. How much does your company invest annually in software development and research? $________________

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Government requirements are covered in an overview of the US procurement network, how it works, and how the proposing firm can increase its "win probability" in competing for contracts. Other topics covered include:

- How to develop an effective "win strategy," mobilize the proposal team, and control the input of the various team members.
- How to organize the proposal contents—what goes where in the management, cost and technical section.
- How to develop task descriptions, manpower estimates, and a work breakdown analysis.

Copies are available pre-paid only from Mercury Communications, Inc. 730-CW Mission, Santa Cruz CA 95060. $55 includes 3-5 day deliv inside USA. In Calif + $3.12 tax.

6. Please indicate below how often during the past year you utilized the following forms of software protection, and indicate how effective you consider them to be. (If you do not know, please indicate with "DK".)

PROTECTION TECHNIQUES	USE Number of Times in the Last Calendar or Fiscal Year: In Business Operations and/or Negotiations	In Legal Action	EFFECTIVENESS Rank order on scale of 0-5*
1. Contract or license backed up by: a. Patent			
b. Copyright			
c. State trade secret law			
d. Release of object program only			
e. None of the above			
2. Requirement for "know-how"			
3. Use of cryptographic protection			
4. Use of other means to limit access to the software program			

*0 = not effective at all; 5 = completely effective.

7. Please list the proprietary software products you market below and indicate next to each whether there is no significance, some or great significance regarding the importance of legal protection for each of the products.

   1. ______________________________
   2. ______________________________
   3. ______________________________
   4. ______________________________
   5. ______________________________
   6. ______________________________

8. Have you ever rejected or abandoned a marketing program for a proprietary software product because of the inadequacy of legal protection?

   Yes __________ No __________

9. Do you know of any situation where software products representing a significant level of innovation are not developed or marketed because of inadequate protection?

   Yes ____ No ____ Please Identify ________________

   ____

   ____

   ____

   ____

10. Do you contemplate any change in your marketing program because of the Copyright Act of 1976, effective January 1, 1978? Yes ____ No ____

11. How would you change your marketing program if legal protection were otherwise improved for computer software? ________________

    ____

    ____

    ____

Thank you for your participation.

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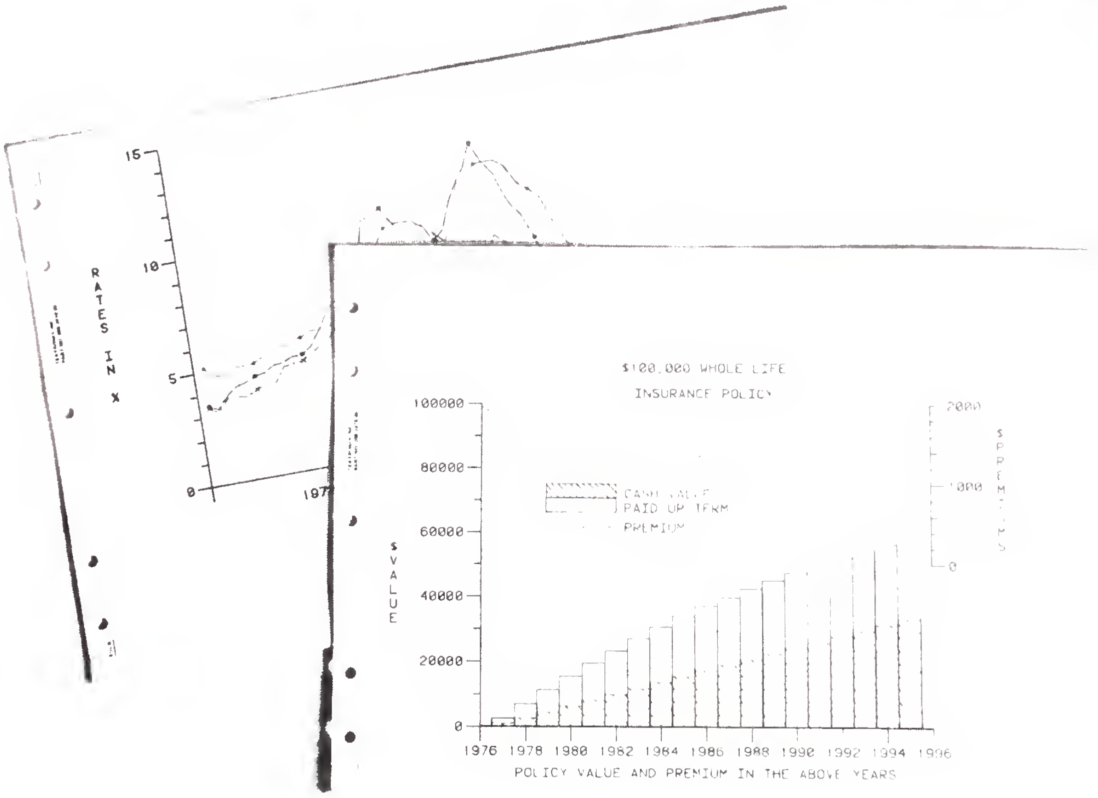

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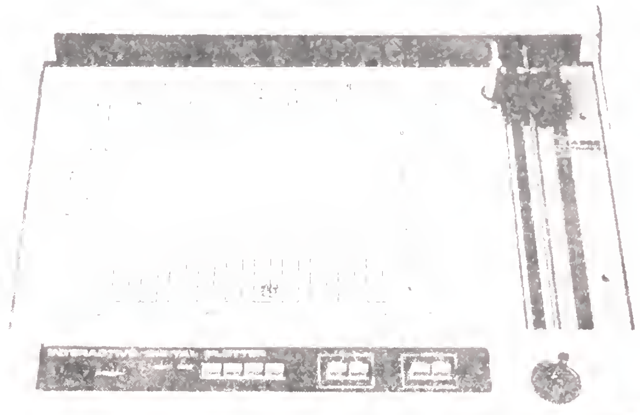

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DP Auditing Viewed as Art Form Instead of Science

By Frank Vaughan
Of the CW Staff

HOUSTON – Auditing a DP installation is not a science – it is an art form without a single "correct" plan and is subject to change and imagination, according to William A. Boss, vice-president of marketing support for Pansophic Systems, Inc.

Speaking at the Fifth Annual International Conference of the EDP Auditors Association here recently, Boss said there are six aspects of an installation that an audit must cover: procedures, controls, documentation, functions of the center, programs and data.

"Of primary concern to auditing is the assurance of auditor independence, no matter what type of audit is performed," he said, echoing the concerns of other conference speakers.

This has been a problem in the audit of the DP installation since auditors have been dependent upon the data center personnel to do most of their work because they do not understand the language of the data center personnel or the computer.

"Audit tools must be established for the auditor's use which provide the ability for him to directly interface with the computer easily, quickly, efficiently and independently," Boss said.

The amount of data in a DP installation is enormous, he noted. Before the introduction of the modern computer, data was maintained on pieces of paper in file drawers. Elaborate file structure systems were used to maintain this data in an orderly manner – which were quite easy to audit, he recalled. All the auditor had to do was find the paper and then do what was required.

Today, however, a great majority of the data is stored in computer files, on either magnetic tapes or disks. This creates a problem for the auditor since he cannot read or look at the data stored on computer files. The auditor now must use information retrieval software systems to extract the needed data from the computer files.

Types of Information

There are eight types of information generally required to perform an audit of the data on the computer files. They are:

- Summarization reports, which illustrate on a summary level the data that is maintained.
- Averages, which can illustrate trends.
- Selected reporting, which provides the auditor with only a selected portion of the data on a file.
- Confirmation notices, which are usually a part of accounts receivable or payable.
- Address or mailing labels, required so special mailings can be accomplished.
- Aging reports, for accounts receivable and for accounts payable in bad times, which are useful in determining delinquent accounts and customer paying trends.
- Stratification analyses, which allow an auditor to review data on a file from a stratified viewpoint.
- Balance analyses, somewhat like the stratification analyses, but which also include the cumulative percentage and a visual presentation of the stratification.

Exception Reporting

Exception reporting is a very necessary function for the auditor, Boss stated. Too often files contain bad data, duplicate data or missing data and the computer system or company is not aware of it until it is too late.

As a result, time is lost because of unnecessary reruns of the program once the file is corrected, or, even worse, reporting of critical data is invalid, he observed.

An audit should not only examine the data, but should verify the data on the files, he said. Invalid data and bad codes fall into many categories.

Points that should be examined should include some of the following questions: Are the codes proper? Are the dates on the file really in the calendar? Are amounts or quantities on the file reasonable? Is there duplicate or missing data?

"When I state that large differences in files should be checked, I mean two things. One is that certain items must have certain values, such as the hourly wage," he said. But he emphasized the need to note differences in figures over time. For example, wide variations in payroll or inventory figures should be questioned by the auditor, he said.

Software Could Ease Use of Lab Animals

ROCHESTER, N.Y. – A computer program designed to do initial toxicity screening on chemicals may reduce the need for costly experiments on laboratory animals.

Developed by Genesee Computer Center here, the program could be used as a first step in the testing process, according to the firm.

Relying solely on laboratory testing is a longer and more costly method, according to David Pixley, vice-president of Genesee. The Toxicity Prediction System screens out which compounds are most likely to be toxic, he explained.

"There is a much better likelihood of success if you do this before going to animal testing," he added. Many compounds can be eliminated in this way before investing in animal research.

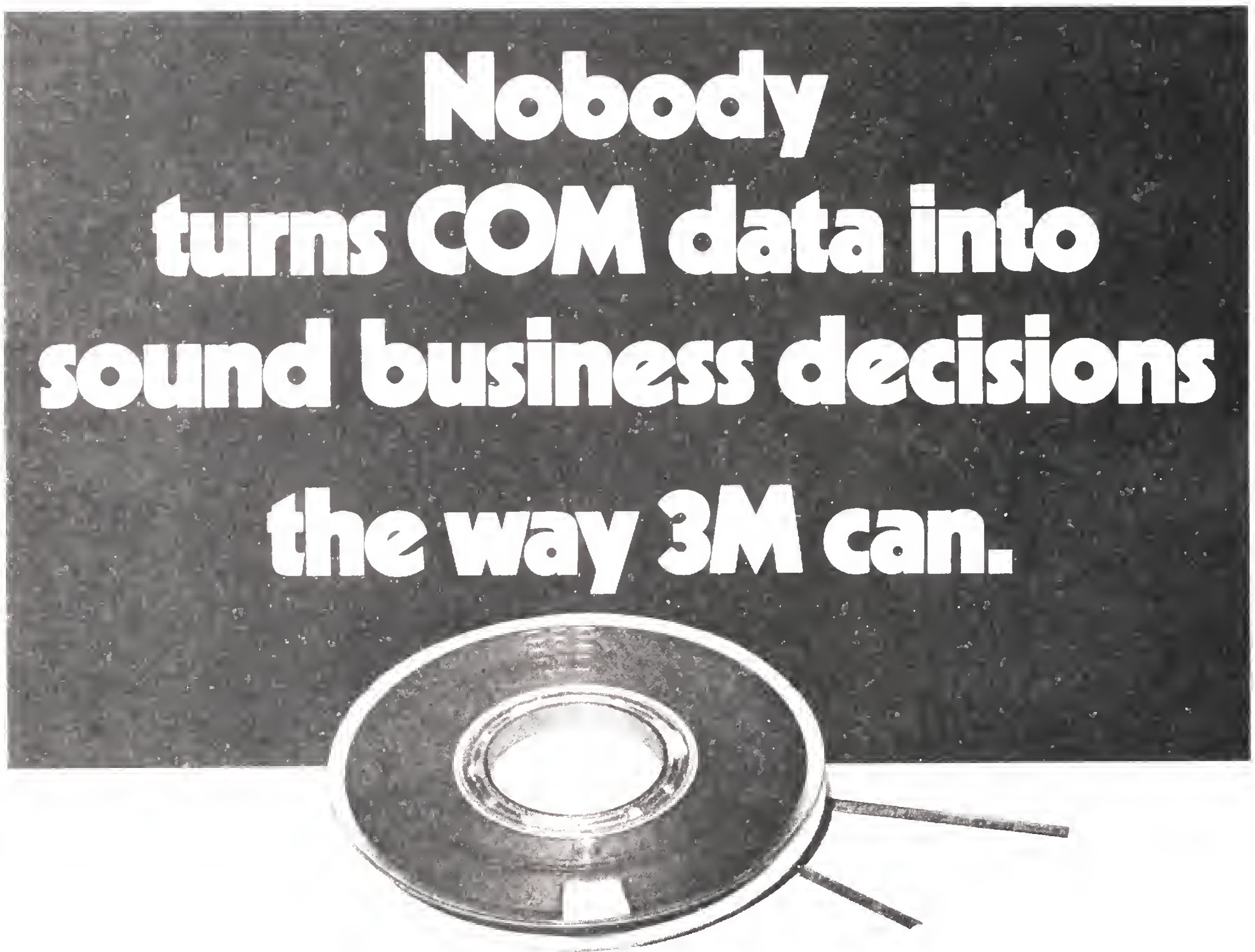
Currently able to run on a Control Data Corp. 6000 or a Cyber system, the software is being tested at various locations but has not yet gone into full-scale usage, he said.

Primarily devised for testing new products before they are introduced to the consumer market, the program has accurately forecast toxic substances 95% of the time, Pixley said.

The data base consists of a combination of statistical patterns, chemical compound structures and known testing data, he said. In order to approve a different compound, statistical pattern recognition techniques are used to determine the toxicity, if any, of the new compound.

The program can produce an estimation of the amount needed for the tested compound to prove toxic to white rats, Pixley said. It is able to eliminate a number of compounds so that the animal testing can be more concentrated, he added.

The program should only be used as a first step before laboratory testing since the forecast is based on "a probability rather than an absolute," Pixley noted.



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Independence Lost During '60s

Audit Computers Seen 'Freeing' Auditors in Future

By Frank Vaughan
Of the CW Staff

HOUSTON — The most significant factor affecting auditors today is their loss of independence during the 1960s, according to Donn Parker, senior research analyst at Stanford Research Institute (SRI). Parker told an audience of 500 at the 5th Annual International Conference of the EDP Auditors Association here recently that auditors can look forward to regaining this independence as time progresses.

"During the 1980s, DP auditors will disappear — at least in name," he predicted. All auditors will be DP auditors and the title will revert to its generic name.

Parker sees the emergence of an audit computer, a prediction that was echoed by other speakers during the three-day conference. This individual computer for audit organizations will be a major factor in regaining independence for auditors.

Calling for a show of hands, Parker noted that less than 10 of the assembled auditors currently had their own audit computer and speculated that it might be interesting to ask the same question next year when the auditors meet in Dearborn, Mich.

DP auditing has not been keeping pace with the needs of the industry during the 1970s, he said. Part of this has been caused by the resistance of traditional auditors, yet this resistance diminishes yearly, he noted.

A second cause Parker cited was that management has not recognized the need for DP auditors until recently. Justifying this contention, Parker showed the results of a survey taken by SRI in which fully one-third of all organizations queried stated there was no benefit to a DP audit.

A third cause of the professional's inability to keep pace has been that the skills and capabilities are only in the formative stages. This, he sid, is being remedied and soon will no longer be a problem.

Switching to the area of DP crime, Parker suggested that the DP community is always going to have crime with it. Although the crimes are going to remain the same — fraud, theft, larceny, embezzlement, espionage, sabotage, conspiracy and extortion — the nature of the crimes will change, to proliferate.

We [illegible] crime [illegible]

Future DP [illegible] different areas [illegible] frauds [illegible] technologists [illegible] and [illegible] Addition [illegible] of [illegible] geographic [illegible]

And even [illegible] to be disregarded, he said. SRI [illegible] in its [illegible] considered by a [illegible] happened [illegible] 'Barnaby Jones,' but the concept [illegible] just the same, he cautioned.

DDP Observers Find Decentralization Not Just Passing Fad

PHILADELPHIA — Although some observers of the trend towards distributed processing have said it is just another manifestation of the craze of decentralization that hits DP every nine years or so, members of a panel at a recent conference here disagreed.

"Once users have the power within their own organization it is very difficult to go back to a centralized system," Frank Finch, manager of on-line systems at E.B. Squibb, said. Squibb originally was centralized and then became decentralized. Another swing of time brought an effort to recentralize, he said, but "now it's very convenient to have the best of both worlds."

"I see several conflicting trends," Steve Heffner, an independent consultant, told the group. "I am around systems that are both centralized and decentralized in the same organization," he said. The economics of centralization are changing, he indicated, and "the productivity of personnel associated with a centralized system drops," he continued.

On the other hand, decentralization provides the problem of duplication, but "I think the sophistication of software and radical drop in the cost of hardware will swing the pendulum toward decentralization," he concluded.

The Penn Central Railroad, now organized as Conrail, began in a decentralized state with about 28 computers, according to Bud Bocher, manager of information services for the marketing department at Conrail. Conrail became centralized at one point, but "we are now working back towards minis," he noted.

"The only reason decentralization has come about is that centralization is no longer economical, George Trimble, president of T-Logic, Inc. said. Trimble predicted the day of the large single mainframe is over and there will not only be a decentralization of hardware but of applications as well.

Technalysis Now Acting As DP Security Consultant

SOUTHFIELD, Mich. — The Technalysis Corp. has recently expanded its computer technical services to include computer security services and computer crime investigation consulting.

These services include disaster planning, computer security site surveys, security management consulting, communications security, computer crime investigation consulting and computer security crime investigation educational workshops.

Technalysis maintains a systems software and applictions development staff with experience in the design, development and implementation of systems for both computer systems manufacturers and their industrywide users.

Technalysis' corporate offices are located in Minneapolis, with additional offices in the Washington, D.C., area and at 20100 Civic Center Drive, Southfield, Mich. 48076.

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By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — [illegible] the [illegible] English [illegible] process, according to a [illegible] recently by the Justice [illegible] Enforcement Assistance [illegible] (LEAA).

[illegible] $250,000 LEAA grant to [illegible] Center for State Courts, the [illegible] study focused on the Philadelphia Court of Common Pleas. In [illegible] reporting reduced [illegible] from an average of [illegible].

The Philadelphia court found computer-aided transcription (CAT) sufficiently successful that [illegible] funding for the 14-month demonstration [illegible] ceased, the project was continued.

But while CAT [illegible] commercially feasible, its implementation can also be "a formidable task," according to the study, entitled "Users' Guidebook to Computer-Aided Transcription." It was written for the National Center for State Courts by J. Michael Greenwood and Jerry R. Tollar.

Several other courts have tried CAT and their success varied in accordance with preparation, design, selection, installation and operations management, the study said.

Improving Stenotype Method

A multistage, labor-intensive process, the stenotype method is the predominant technique used to record and transcribe court proceedings. CAT "is a technological approach to improving and expediting the stenotype method by reducing the reporter's involvement in the burdensome transcript preparation process," the study stated.

Courtroom testimony is recorded on a modified stenotype device that produces paper notes but which also records the reporter's keystrokes on cartridges or cassettes that can be ready by I/O devices, the authors explained.

An IBM 370/145 running under DOS makes a first translation of the electronically recorded stenotype notes into "reasonably accurate English prose."

This translation is conveyed either on magnetic tape or through a telecommunications system to a text-editing subsystem consisting of a minicomputer, a CRT for editing by the court reporters, a dual disk system for storage and a cartridge/cassette reader, the study reported.

The text editing corrects any errors in the format or text of the transcript produced in the translation by the mainframe. The printer produces the final official transcript once text editing is completed, the guidebook said.

Philadelphia's text-editing subsystem consists of a Data General Nova 1200 mini with 24K core storage; Diablo 2.4 M-byte dual storage disks, an Iomec 312 input cartridge reader and two Beehive Superbee CRTs.

A Dataproducts 2310 line printer and an off-line decollator and burster complete the court's CAT configuration.

In making their study, Greenwood and Tollar examined the CAT implementation in the large-scale Philadelphia court operation. They also monitored the progress of CAT instituted or demonstrated in courts in Baton Rouge, La.; Cincinnati, Ohio; Dallas; Detroit; Tucson, Ariz.; and 20 locations of the U.S. federal district courts.

Finally, the study's authors evaluated commercially available CAT systems for the courts by establishing production standards and assessing CAT vendor capabilities. The conclusions they reached concerning the four vendors in this field (Baron Data Systems; Stenocomp, Inc.; Stenographic Computer Systems and Stentran Systems) are included.

In analyzing the Philadelphia CAT project, the researchers looked at the number of days needed to prepare a record of court proceedings using CAT, the total cost per page related to the transcript's preparation and the percentage of time the court reporters were involved in the transcription process.

Economically Competitive

When developed with proper management controls, CAT is economically competitive with traditional transcription methods. In 1976, the actual transcription cost in various courts ranged from 70 cents to $1.75 per page. These costs are significantly down from the $1.50 to $2.25 per page estimates made in 1974.

CAT does permit better utilization of court reporters, both for recording courtroom testimony and for preparing official transcripts, according to the study. But of all official court reporters, only 40% to 60% are sufficiently accurate and consistent in their notetaking to permit cost-effective computer transcription of their notes, without extensive editing.

The study recommended that courts experimenting with CAT should select reporters who are accurate enough for the mainframe to produce a first-run translation that is 95% accurate and who can edit text on a CRT at the rate of 25 pages per hour.

In the future, more stand-alone CAT systems, consisting of a single minicomputer capable of totally producing CAT, including translation, text-editing and printing operations, will be developed, the study stated.

Copies of "Users' Guidebook" to Computer-Aided Transcription" can be obtained by writing: National Center for State Courts, 1660 Lincoln St., Suite 200, Denver, Colo. 80202.

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Chicago's Poor Get DP Courses

By Catherine Arnst
Of the CW Staff

CHICAGO — The Chicago Urban League has started a computer training program for poor persons with help from both private industry and the government.

The program trains students at the "dirt cheap" price of $85 per pupil per year with the aid of extensive private donations, Darrell Perrish-Johnson, director of the computer training school, said.

The school, which opened April 4, currently has 59 students (one dropped out) in three courses and plans to train 721 over the next four years. Currently, there are three areas of training: operations, programming and data entry.

The programming course lasts 12 weeks, the operating course, nine and data entry, eight weeks. The first two require high school or equivalent education, while data entry requires an eighth grade reading level, Perrish-Johnson said.

The students are selected from the state's Comprehensive Employment and Training Act (Ceta) program and are basically low-skilled people who need training to be employed, she said.

There are 31 males and 28 females, and the ages range from 18 to 43, with most of the students in their mid-20s. Race is not a consideration, she added.

Three of the students have college degrees, 24 have some college education and five do not have high school diplomas, she said.

Planned Since '71

The school had been on the drawing boards since 1971. It was started with donations of $96,000 from Chicago businesses.

In addition, IBM donated a 370/135, four 3742 dual data stations and four people to manage and teach at the school.

Montgomery Ward donated 6,710 square feet of downtown office space rent-free and with utilities paid, according to Perrish-Johnson, who added that some say the firm is competing with Sears Roebuck, which has sponsored similar programs.

Without these donations, the school could not have opened, she said.

The state reimburses the Urban League, a nonprofit organization, for all the school's operating expenses, and the Ceta program pays students $2.30/hour to attend classes. The classes run eight hours a day, five days a week, and students are not allowed to have another job while in the program.

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Cost Accounting Method Seen Important to Operations

By Ronald A. Frank
Of the CW Staff

DALLAS — A DP center's cost accounting method provides information to management that can be significant for business operations, according to speakers at a recent conference session here on guidelines for cost accounting practices.

The collection of cost data means it is usually necessary to set up functional cost centers within a company, Norman Statland, of Price Waterhouse & Co., said. In a typical company, this can range from three to 20 or more centers, depending on the size of the firm.

In order to determine where the centers are to be located, it is normally best to use the hierarchy of the organization, thereby establishing the centers according to their functional activity and their relative importance to the firm, Statland said.

One of the benefits of establishing a charge-back system for user departments is that it separates jobs with "real needs" from those which have a lesser priority, he noted.

"If costs can be measured and work effort measured, then rates can be established for charge-back procedures," Statland said. If work effort can't be measured, then the task is probably an overhead function.

The type of costs that should be folded into a charge-back system for user departments include salaries, occupancy costs, equipment charges, supplies and communications costs. Cost structures will fall into either the direct or associated cost category.

The prime reason for establishing a charge-back system is to foster systems planning within a company, according to John Dratch of the J.C. Penney Co.

Most managers react to measurement against expected budgetary performance. In this regard, the creation of a charge-back system requires budget projections of user department needs, he said.

This in turn leads to establishing a user rate based on the department's DP requirements, Dratch explained. Often management can use a predetermined rate to measure the efficiency of a DP center.

'Potential Trap'

Statland disagreed with this concept, pointing out that it could be a "potential trap." He said that if a DP center were operating at 70% capacity as a normal parameter, any major fluctuations in operating patterns would raise questions from management.

Questioned on whether and when jobs should be farmed out to noncompany sources, Dratch said he believed the DP department should make these decisions based on available budgets and in-house expertise.

The panel agreed that the next step after the implementation of a charge-back system would be initiating a transaction costing scheme.

Firms will be going to a transaction pricing system in the future, but this will be accomplished only when a company has a good idea of what its DP costs are.

Although no "hard and fast rules" exist for charge-back systems, according to Statland, a key to making the process work is to tie budgetary guidelines to the charge-back rates.

In many firms, the establishment of a charge-back system is very beneficial because often "they don't know what their costs are," he said.

Public TV Station Borrows Mini, CRTs For Annual Auction

NEW YORK — Lucky bidders at WNET Channel 13's recent third annual auction recently were greeted by customer service volunteers at CRT workstations when they picked up their booty.

The CRTs were linked to an ICL, Inc. 2903 minicomputer on loan to the public T.V. station from the vendor, according to Frank Bonanno, director of DP.

"Usually we ask for all sorts of support services from the community and we asked ICL if it would lend us a system," Bonanno said. The station has an ICL minicomputer of its own, he added.

The system has been credited with reducing the start-up time of the auction significantly and simplifying the handling of the more than 10,000 items that were auctioned since June 3.

Starting in mid-April, the system was fed information through ICL Direct Data Entry (DDE) devices about each donated item, including its name, its identification number, a description and the name of the donor.

After the initial inventory was created, 14 CRT units were positioned both at the auction site and at the warehouse receiving area. The two CRTs at the warehouse were used to check the items upon delivery and to code each item for its location.

Five of the consoles were used to enter winning bidder information, including names, phone numbers, amounts of bids and dates of pickup.

Another several CRTs were in the reception area to validate winning bidders. After they were validated, the method of payment was entered into the system and the necessary receipts were obtained to release the item and complete the cycle, he added.

For the last two years the station used its IBM System 3, which it has since replaced, to update the auction information and print reports. "A lot of paperwork was required at the auction," Bonanno said, and the elimination of this paperwork by using the ICL system will reap considerable time and handling benefits.

The totally dedicated system ran ICL's Transaction Processing System. A consultant from the vendor came from England to help the station with this particular software.

The only thing that could have gone wrong is "the people factor," Bonanno said. Most of the people handling the CRTs were volunteers who may not have been familiar with the way terminals work. However staff was on hand to handle any problems, he said, and the auction ran smoothly.

The station's loaned system had 40K words of memory, two 60M-byte disk drives, two DDE devices, a 600 line/min printer and 14 displays.

WNET's own ICL system, which is used to keep track of membership or station backers and general business applications, has a 40K word CPU, console with keyboard, three 60M-byte disks, one 10M-byte fixed disk, a 300 line/min card reader, a 1,500 line/min printer, four DDE stations and several CRTs.

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The Waves of Change

By Charles P. Lecht

Whither virtual? Lecht believes 'virtual storage, virtual processors, virtual I/O concepts and virtual terminals will create the framework for achieving the critical ease-of-use objectives' of the next generation. That generation is already on its way in the form of such 'bridging devices' as the IBM 3033.

CHAPTER VIII (Continued)

When virtual storage (actually a design compromise) was first developed in 1956 (through the University of Manchester's Atlas computer project), the primary objective was to overcome the high cost of real main memory. In the mid-1970s, semiconductor main memory has become relatively inexpensive, with prices dropping steadily.

Is the virtual storage technique really necessary later in this decade?

From the cost-of-memory point of view, the answer is still yes. Moreover, as a programming aid, virtual storage and virtual machine techniques are very important. Although MOS storage will continue to decrease in cost, users will never satisfy their appetite for more and more on-line storage.

The IBM 370 virtual storage implementation is crude in that all I/O operations (Channel Control Words [CCW] and buffer areas) are translated from virtual to real to virtual by software (no I/O DAT, or Dynamic Address Translation, hardware feature exists). This causes on average about 15% CPU overhead. Actual overhead depends on the number of CCWs, among other factors.

In contrast, the Fujitsu M-190 design, which is 370-compatible, has already implemented an "I/O DAT box."

Virtual Machine/370 is the eighth operating system within the 370 series. This is a technique which allows the system to control multiple "virtual machines," each with its own user operating system.

The VM/370 operating system (with microcode assist features) is the foundation upon which IBM will build a massive programming and capability. A virtual machine concept permits several users to utilize a subset of hardware resources with total separation and protection (while the resources appear to each user to be unshared with anyone else).

With VM/370, the programmer assumes the memory and other resources to be practically limitless (16M bytes per user, maximum). As such, large complex programs can be written more quickly. System/80 will create the basic architectural foundation for the new application development environment and for later improvements in software, microcode and hardware technology.

Virtual techniques will also enable IBM and other innovative DP manufacturers to construct information security systems. Privacy of data will be a vital part of the system. For example, control of fetch commands is an inherent part of VS. Critical data will be fetched only when proper authorization is included in the command.

In remotely or locally distributed systems, certain processes and data will simply be unavailable to some users.

'New and Better Tools'

Virtual storage, virtual processors, virtual I/O concepts and virtual terminals will create the framework for achieving the critical ease-of-use objectives.

In addition to the programmer aids mentioned above, system software should also contain improved debugging tools. Very importantly, system changes should be nearly transparent to the user (system resources should be accessed "logically," not physically) so that previously checked-out programs will be unaffected by hardware configuration changes (except, of course, in terms of performance or response time). This concept is extremely important in that it simplifies upgrading, or migration to new hardware.

Accurate predictions of performance of a given configuration in a given environment must be possible. With this in mind, installation managers will be given new and better tools for evaluation purposes, to assist them in optimizing the total system design.

System profiles, component performance and batch/real-time processing efficiency will all be measured with appropriate new techniques. Use of these methods will even permit the measurement of the impact of one operating environment on another, when both utilize and share the critical resources.

After a system is installed, it should have the ability to monitor its own performance. Workload status as well as hardware utilization information can all be displayed. The total system should remain responsive to changes in conditions, automatically and at all times.

The system of the next decade must minimize the need for human intervention and dynamically allocate resources and schedule workloads so that throughput and response time requirements are satisfied. Automatic error correction, retry techniques and on-line failure analysis must be available.

On-line systems of the 1980s will rarely shut down. Continuous processing results in more work output per dollar of investment in the system or network. IBM discussed this "service-free system" (SFS) in the Management Review Committee minutes of April 19, 1971.

Business Considerations

IBM cannot obsolete the 370 series with System/80 on a price/performance basis *alone*. Leasing companies, together with independent, plug-compatible manufacturers (PCM), will find many ways to enhance and extend the life of their vast inventory of used 370s (as they did in the past with 360s).

Newer peripherals, higher density memories and similar embellishments, together with greater discounting, will all inject new life into the "old" partly or fully depreciated 370 systems. Transaction pricing may be just around the corner.

IBM is well aware of this problem and System/80 must, therefore, obsolete the 370 on a functional and reliability basis, clearly demonstrating "ease of usage" or "people productivity" benefits which more than compensate for reduced prices of "old" 370s from third parties. Obviously, greater "raw" performance/price will also be expected by then.

According to IBM, recent studies of the DP budget have shown "that a larger and larger portion is comprised of *personnel cost*, as hardware price/performance continues to improve, decreasing the hardware portion." A 1970 study stated that "the personnel portion was 53% of the budget compared with 35% for hardware and 12% other."

In 1973, IBM found that *application maintenance* absorbed 42% of the people costs while only 52% was allocated to "new application development."

Other surveys, conducted by IBM in 1971, attempted to break down the programmer/analyst time devoted to conversion efforts, maintenance and new development. These results showed that, on average, 17% of the application programmer's or analyst's time is devoted to conversion, 35% is spent on program maintenance and 46% on new application development.

Obviously, maintenance continues to grow as more applications are completed, and it is projected to absorb the lion's share of the user's resources by the latter part of the '70s.

A prime objective of System/80 and comparable systems offered by other vendors, therefore, is to use new hardware and software techniques to increase programmer and end-user productivity in the application maintenance and development areas. One way to achieve this result is to reduce the user dependency on DP "specialists" (analysts, programmers, etc.).

Without these productivity improvements, the user would *not* be able to absorb the increased raw computer performance, and the marketplace would ultimately stagnate.

The 'Bridging' Strategy

During the interim period, prior to System/80, IBM is concentrating on data communications and networks (e.g., recent developments including SNA, SDLC, 3790, 3600, 3650, 3767, 3770, Vtam and NCP) and data management (e.g., 3850, IMS/VS and Vsam). In other words, it is focusing its attention on the "bridging" devices (peripherals, software) and "appliances" (terminals).

I suggest the reasons for this are as follows:

1. Mainframe purchase activity (e.g., 158 and 168) should decrease substantially in 1977-78, and IBM must attempt to fill this potential "revenue gap" with other products (although the anticipated 3032 and announced 3033 processors would tend to offset this potential revenue shortfall).

2. The corporation must get the "appliances" installed before it announces the new System/80 "dynamo"; otherwise, most users will *not* be able to absorb the significantly greater power of System/80 and the market will stagnate (a similar situation arose at the beginning of the 370 era in 1970-71).

3. In order to convert 370 customers over to System/80 as painlessly as possible, it must start a "preconversion" activity *now* (SNA, SDLC, Vtam, NCP and Vsam are some of the key software/firmware "bridging" vehicles).

The end result (if the strategy is successful) is that many of the remote (external to mainframe) terminal devices will be in place: the important data comunications networks and data management functions will already have been converted and remain essentially compatible with System/80 in advance of the "dynamo" announce-

Figure VIII-6

(Continued on Page 17)

RATE OF INCREASE IN MIPS/$

System Series	First Shipped	MIPS/$	Elapsed Period
Early 360s	1965	1:1	
Original 370s	1971-72	2:1	6-7 Years vs. 360 Series
Enhanced 370s	1976-77	3.5-4:1	4-5 Years vs. 360 Series
3033 (3032 & 3031)	1978-79	8:1	2-3 Years vs. 360 Series
System/80	1980-81	16:1	2 Years (Our Forecast)

Figure VIII-7

IBM'S APPARENT LONG-RANGE STRATEGY SUMMARY

GOALS	SYSTEM/80 METHODS AVAILABLE
Stimulate customer productivity and growth	Greater "functionality," ease of usage, high-level languages and problem-oriented languages, reliability and availability
Unify system software and reduce maintenance costs	One operating system for all users, security/integrity and privacy, distributed function, microcode, simplified software interfaces
Improve system posture vs. competition and lock in user base	More "functionality," accelerate technological rate of change, create new de facto standards, innovate
Reduce PCM exposures (peripherals, terminals and memory)	Distributed function, integrated packaging, microcode, multiple unique adapters, SDLC and loop attachments, complexity, host operating system software dependency
Increase profit margins	Exploit IBM economy of scale via LSI, common circuits and building blocks, unified software support and maintenance
Totally obsolete the 370 (eliminate or reduce used computer exposure)	RAS, functionality, privacy and security, ease of usage, greater effective performance, easier conversion, stabilize or reduce the people costs
Optimize FE/SE resources	Remote hardware and software diagnosis, remote Systems Engineering Application Development Services
Prevent downgrading	Special system packaging, software "diodes," controlled subsystem attachment by System/80 model

Figure VIII-8

(Continued from Page 16)

ment.

Volume production and deliveries of the Model 3033 will not get rolling until about the second or third quarter of 1978. Therefore, the vast majority of IBM customers will install this product in 1979.

Considering the huge influx of orders, one can extrapolate an enormous potential customer financial commitment over five years of nearly $8 billion, based on an estimated maximum production capacity of 400 units per year (worldwide average) for five years, or 2,000 units at about $4 million each. In contrast, peak 370/168 production or shipments of about 275 units occurred in 1976.

In light of this, one must ask: What is the expected life span of the 3033?

Short Life Span

According to R.T. Fertig, an industry analyst, the IBM 3033 and its forthcoming additional members — models 3032, 3031 and 3033 multiprocessors — appear to represent *interim* products with a relatively short competitive life span. Some of the evidence supporting this conclusion is as follows:

1. Lack of Architectural Improvements

A. The 3033 has a limited address range of 24 bits (16M bytes), which is insufficient considering the 100M byte main storage capacities expected in the early 1980s.

B. Like the other members of the 370 series (and other competitor systems), the 3033 cannot be "certified" as a secure system because of inherent architectural limitations in both hardware and software.

C. The 3033 channel functionality and total bandpass is still too restrictive (1.5M to 3M byte/sec) to handle a hierarchical storage structure with high speed staging devices such as charge-coupled devices, bubbles and bulk MOS storage devices.

D. Although the reliability, availability and serviceability (RAS) characteristics are sufficient for the 1970s, we believe that far greater RAS capability is essential for the critical data base/data communications applications of the 1980s.

2. Minor Technology Enhancements

A. The 3033 processor circuits are effectively about twice the density of the Model 168 and not state-of-the-art (e.g., the three-year-old Amdahl 470/V6 or Fujitsu M-190 provide higher density circuits).

B. The processor must be water-cooled because of the high level of heat which must be dissipated.

C. The main storage chips are still 2K bits vs today's delivered 16K-bit memory chips.

3. A Bottom-Up Design Change

An IBM spokesman explained the approach taken to the 3033 thusly: "We took the best of the 168 design and improved on it" to achieve greater instruction throughput or millions of instructions per second (Mips); e.g., buffers were expanded, extra registers were added, the I-unit was enhanced, interleaving level was doubled, etc.

It is also apparent that the 3033 was rushed to the market (believed to be a very short two-year development cycle vs. a typical five- to six-year phased development) in response to serious competitive challenges from the plug-compatible Amdahl, Fujitsu, Hitachi, Itel, Control Data Corp. and other mainframer products, e.g., Burroughs B7800, Univac 1100/80, Honeywell Information Systems 66/85, etc.

4. A New Generation System should be Introduced by 1980

A. The code name for the System/80 project is "New Grad." The high end of S/80 is known to be under development by an organization under the direction of Dr. John E. Bertram, IBM Systems Products Division vice-president of development and manufacturing.

B. We believe that "New Grad" will represent a major, but evolutionary and compatible, architectural and technological improvement over the 370 Series (including models 3033, 3032, 3031, etc.) and that S/80 will directly and effectively address the data security, ease of use, RAS and other vital functional requirements for the early 1980s.

5. Accelerating Rate of Technological Improvement (Performance/Price)

In 1971-72, the earlier versions of the 370 series represented less than a 2:1 *mainframe* performance/price improvement over the 360 line (using the Model 50 as a base for comparison); the 360/50 was initially delivered in 1965 and its successor, the Model 145, was first shipped in 1971.

By 1976, the substantially improved models 138 and 148 (among other 370 models) established a new performance-price curve of about 3.5 to 4:1 compared with the 360/50.

Finally, by mid-1978 or 1979, the 3033 (also models 3032, 3031 and multiprocessor versions) will nearly double this performance/price (Mips/$) relationship such that a 3033 processor will offer approximately 8:1 performance/$ improvement ratio vs. the 360 curve.

In summary, the rate of increase in Mips/$ is accelerating as indicated in Figure VIII-7.

Dilemma for 3033

Assuming that the factors in the chart (admittedly circumstancial evidence) are approximately correct and that some members of S/80 are introduced by 1980, would it be prudent for IBM's 3033 customers to be locked into a four-year lease or purchase the 3033 in 1978-79? Obviously, the answer to this key question would vary depending on the individual customer circumstances.

IBM management may also decide to extend the life of the 303X line and delay S/80 one or two years; i.e., why take the risk of introducing new concepts, architecture and technology when the customer base is content with the old structure with improved Mips/$?

Another possibility is that S/80 may be a bottom-up announcement sequence (S/370 was top-down) and IBM wishes to avoid the typical "bubble" order effect when an architecturally new series is introduced with the obvious initial revenue shortfall. Therefore, one solution would be to lock in the high-end customers prior to unveiling S/80 at the low end (370/115 and 125 level).

Lecht is the author of four previous books on computer-related matters: The Programmer's Fortran II and IV, the Programmer's Algol, the Programmer's PL/I *and* The Management of Computer Programming Projects.

He is president of Advanced Computer Techniques Corp., which he founded in 1962, and has lectured widely for such groups as the Association for Computing Machinery, American Management Association, American Society for Information Science and Data Processing Management Association.

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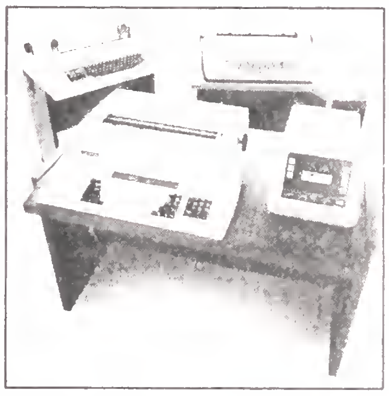

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Editorials

What Do You Think?

Often in the past we have advocated copyright protection for computer software as opposed to patent protection for computer programs. We may have been wrong.

We still don't like the idea of patent protection, but a long dissent by author John Hersey [CW, July 4] to the recent working report of the National Commission on New Technological Uses of Copyrighted Works (Contu) made us pause in our advocacy of copyright protection for programs.

Is a computer program really an act of imagination like a novel, poem or long piece of nonfiction? Is it in the same class as the written word in magazines and newspapers?

As Hersey said, each program may be considered a written creation of an author up to a certain point, but "beyond that point the same program is embodied in material form and becomes a *mechanical device*, which is engaged in the computer to become an essential part of a mechanical process.

"Thus the computer program is something strikingly new in our culture," Hersey added.

Perhaps, then, it is not a good idea to try to fit this new idea, a Janus-faced mixing of art and science, into an older system. Perhaps a new form of protection is needed, designed specifically for this new concept.

What do you think?

Time to Crack Down

Two people at Univac have been arrested for allegedly stealing time on a computer owned and operated by that firm, but the charge is mail fraud and conspiracy since there is no law covering computer crimes and criminals [CW, July 4].

But all that might change if Congress passes a new law proposed by Sen. Abraham Ribicoff (D.-Conn.) which would specifically cover this insidious type of white-collar crime.

It is a needed bill that is long overdue.

For too long white-collar crime has been tolerated in this country. The penalties for such crimes are not as stiff as those for other crimes — the embezzler gets a shorter prison sentence than the armed robber, even though the amount stolen is often higher. The computer criminal, when rarely apprehended, is tried for such things as mail fraud or wire fraud with relatively light penalties.

The Ribicoff bill would change all of that. It calls for prison terms of up to 15 years and fines of up to $50,000. Its existence would make law enforcement officials more aware of such crimes, hopefully leading to programs to train officers to detect such crimes, which too often go undetected today.

The bill is a good one and it apparently has bipartisan support ranging from liberal Democrats like Senators Ribicoff and Edward Kennedy to conservative Republicans like Strom Thurmond and Robert Griffin.

The legislation should be a high-priority item and people in the computer community should support it wholeheartedly, since most are honest and hardworking and should want to weed out the few bad apples in the barrel.

'There Are Only Two Problems . . . '

Letters to the Editor

Weil Modifies View of IMS/VS, But Lecht Finds It Still 'Poor'

Charles Lecht, in his book *Waves of Change* quoted my assessment of IBM's IMS data base programming system [CW, May 9]. My observations were based on the views of an IBM user group which had been assembled in San Francisco by an independent market research firm.

It may interest you to note that subsequent to this user meeting, which was held in April 1976, I modified my views on IBM's IMS/VS per the attached article dated Oct. 11, 1976. In fairness you may want to publish the paragraph relating to IMS - VS in my Oct. 11, 1976 report.

Ulric Weil

Morgan Stanley & Co.
new York, N.Y.

Weil enclosed a "Progress Report" on IBM published by Morgan Stanley & Co. which said, in part, "Recent analysis reveals that IBM's much-maligned IMS/VS data base system (see our *Progress Report* dated May 7, 1976) is now performing more satisfactorily than we had expected. (Our observations last spring were based on data relating to IMS/360, collected in late 1975.) IBM's recent improvements of IMS/VS appear to have remedied much of what was wrong with IMS." Ed.

In reference to Ulrich Weil's letter to you, IBM's principal medium- to large scale data base offering, IMS/VS, may in fact be performning more satisfactorily. Generally, however, all manufacturers tend to improve their product offerings over time if they wish to remain competitive.

The question, then, is how one can quantify this relative improvement and evaluate the true customer perception of IMS/VS. Most IMS/VS users are not on latest versions. Not unexpectedly, the newest version package price has recently gone up.

A recent survey of over 500 IBM installed data base users indicated only about 12% are currently using the old IMS2 (360), 34% are using IMS/VS (DB) and approximately 27% were running IMS/VS (DC). Obviously, some overlap of survey response between the DC and DB versions is probable; however, surprisingly, nearly 30% were using Mark IV (a non-IBM data base package).

Moreover, the same extensive study found that on the average about 35% of the current users think IMS/VS is not suitable for their future needs.

In our judgment, based on this survey as well as upon Advanced Computer Techniques Corp.'s extensive experience dealing directly with data base users, IMS/VS has improved. That is, it has moved up from atrocious to poor, with CICS/VS possibly having taken over the spotlight in the atrocious category.

Charles P. Lecht
President

Advanced Computer Techniques
New York, N.Y.

In Defense of Consultant at Rest

Regarding the photo front and center Page 1 of your June 20th issue, please be advised that Roger Buchanan's phone has not stopped ringing since.

The unfair implications of this picture have been widely misinterpreted, as Mr. Buchanan is one of our senior staff consultants and was in Dallas demonstrating a microcomputing system we at Performance Development Corp. have developed for a client.

Mr. Buchanan is simply exhibiting PDC's innovative flair for going to the source for the requirements statement. That such a source may have departed does not always deter us.

Leo J. Cohen
President

Performance Development Corp.
Princeton, N.J.

Other letters on Page 20 and 22.

Data Past

Five Years Ago
July 12, 1972

WASHINGTON, D.C. — Sen. Sam J. Ervin (D-N.C.) charged the Supreme Court with "unwisely and wrongly" ignoring the danger of computer-based data banks when it rejected an attempt to outlaw such dossiers in the Tatum vs. Laird case. To remedy the court's alleged oversight, Ervin introduced legislation in the Senate to prohibit the Army or any military service from conducting data bank operations on civilians.

— — —

DAYTON, Ohio — Codasyl's Programming Language Committee met here to consider a proposal to delete the Report Writer facility from the Cobol standard. The proposal, initiated by the Air Force, called for dropping the RPG-like function because "it was redundant with features in the language and too complicated for the general report-writing needs of the user community."

Eight Years Ago
July 16, 1969

WHITE PLAINS, N.Y. — IBM cut its maximum educational discount from 30% to 10% and announced that effective Nov. 1 it would no longer offer an educational allowance on maintenance agreements.

DP Experts See Need for Better Performance Measures

By Jack Stone
Special to Computerworld

Productivity was my watchword last week. First, I attended the National Conference on Computer Systems Productivity, sponsored by *Government Executive* magazine and the Capitol (D.C.) Area chapter of the Society for Management Information Systems, where I made a presentation on human engineering in the DP environment.

Then, I was invited to give a talk on productivity considerations in the operations department to the DP management group of a large corporation.

My briefing was one of four given the same day by a panel of outside consultants to this company, whose management has become vitally concerend with improving productivity in all areas of its DP activity. The other talks dealt with productivity gains possible through human resource development, systems analysis training and structured design and programming techniques.

As I reflected on my experiences of the last week, I reached several conclusions.

First, the issue of productivity is one of significant and growing concern to management. I believe this interest derives in part from the difficulty senior DP managements are having in justifying their continually increasing budgets to top executives and, in part, from the difficulty top executives are having in justifying incumbent DP managers in their current positions.

I believe few front-office executives feel they have adequate measures or standards of performance or productivity from the DP organization. I suggest the current wave of DP management insecurity has come about because the shakers and movers of business and government organizations are no longer tolerating the absence of valid and comprehensible performance data. They are saying, to paraphrase a familiar machine-room expression, "Get the DP data up or get the DP managers out!"

Second, the arena for determining productivity has vastly broadened — moving from the narrow focus of channel contention for disk drive access to serious consideration of the broadest issues relating to quantitative measures of productivity in terms of user acceptance and organization profitability.

Bob Head said at the conference "Work on system productivity has been largely at the relatively narrow technical level of seeking to improve performance by obtaining greater 'throughput' from installed equipment.

"What is now required, and is indeed already beginning to take place, is a broadening of this activity through its elevation to the level of top ADP management interest. The utilization of complex and expensive system resources is becoming a problem too great to be left to performance measurement specialists."

Third, a scientific and quantitative approach to performance measurement is moving rapidly into all areas of the DP function. Ken Rau suggested at the conference that "performance measurement applied to application software development, application maintenance, equipment operation, data control and other functions and tasks associated with DP can produce far greater improvements in control, productivity and motivation than can computer performance evaluation techniques alone.

"Furthermore, [illegible] performance measurement program can provide management with its first cumulative reports [illegible] ing and analyzing the data [illegible] source."

On the other hand, the [illegible] techniques and methodologies for [illegible] ing objective [illegible]

The Human Connection

successful productivity measurement program. There is the very practical — but often overlooked — matter of gaining agreement from all interested parties on what constitutes the productivity standards, how productivity should be measured and what action should be taken to control deviations from standard.

"The most difficult task in improving productivity is developing a plan that is comprehensive, cost-effective and acceptable to the many parties involved in the total computer system," Leo Birnecut commented at the conference.

Another conclusion is that increasing attention is being given to the particular challenges of improving the productivity of DP personnel in ways other than providing the time-worn mechanical solutions of more computer time and systems development techniques and methods. One concern is that of seeing human productivity diminish as hardware becomes obsolete.

John Carabello, director of automation policy at the U.S. Department of Defense [illegible]

[illegible] also [illegible] is [illegible] the need [illegible]

[illegible] significantly [illegible] the DP environment [illegible] ignored, with the [illegible] of the data entry folks.

Granted that DP people operate as teams, but there are still objective measures that can be established by competent DP managers and supervisors to establish productivity goals — or is it that these people want to avoid measurements of their own performance?

Sale of State's Driver Master Tapes Causes Concern

The idea of using laws to protect privacy from invasion by computer is now generally accepted. This is quite a change. Only a few years ago it seemed that because the noncomputer era had needed no such protection, it would be improper to effectively penalize the computer era by putting additional constraints on computer operation.

The Taylor Report
By
Alan Taylor, CDP

However, the increasing flood of computerized output in various forms gave rise to the realization that action had to be taken. As computer power made the use of large masses of information more economical, personal data became subjected to some questionable uses.

A lot of the controversy swirled about the use of the Social Security number (SSN), which was at that time approved by many of our professional bodies for use as a universal identifier, suitable for connecting records from various areas. The proponents of the universal identifier idea argued mainly on economic grounds. They urged that Social Security numbers should be given out at school age, or earlier. The opponents argued that the dangers of possible abuse by people developing "dossiers" was too high a price to pay for such an economic advantage.

During the struggle, a large amount of unexpected use of the SSN was found to exist in areas well outside its original intention — such as in library cards, student numbers and driving licenses.

As these uses were found and commented upon, it became general practice not to absolutely insist on the use of a person's SSN if he objected to revealing it and having it used, while continuing the practice of normal use of the number for the great majority of cases.

At the same time, privacy legislation went into effect to protect the public from the dissemination of personal data, and the whole issue faded back into near-oblivion, with potential abuse apparently checked.

However, a recent advertisement in the Boston area offering for sale the master file of the driver registrations in Massachusetts made me wonder whether there has been any real change or only a cosmetic one.

Certainly it has raised questions with some readers of this column who feel that their personal data should not be made available by the Registrar of Motor Vehicles without their knowledge and consent. And the facts seem such as to support their fear — even if the current privacy law does permit the distribution of "public records" containing personal data so the legality of the sale seems unquestionable.

Borderline Case

Yet the whole matter makes me uncomfortable. It seems to be a borderline case. No one has suggested that any actual abuse has been identified. The objection comes from the possibility of abuse.

A specific objection has been made by readers to the distribution of the SSN. It has been argued that if the registrar is going to sell the master file, then everyone should have been told of his intention before they were asked to provide their SSNs.

Another objection has been made to the continued use of the SSN for any use if sales are to take place. And I see merit in that point, too.

Yet the real question is whether the public record exemption, in this computer age when the economics of mass data processing are so attractive, makes sense as a blanket exemption from privacy rules. Suppose the registrar had properly warned people about his intention to sell or had completely abandoned the use of the SSN as an identifier.

Suppose the "master file" is in its most innocent possible form — name, address and nothing else. Would there still be an objection to copies of the master tape being sold?

If so, what is the basis for the objection? How would proper access to public records be attained if such mass sales were to be forbidden?

These are the questions that really need answering in order to see why the current situation is uncomfortable. If you have any answers, pro or con, on any of these questions, please let me know. The best way would, of course, be through a letter. But a quicker way may be to use the questionnaire provided here.

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What Are Your Views?

The Massachusetts Registrar of Motor Vehicles is currently selling the master tape of registered drivers in the state. Social Security Numbers are normally used as the license identifier, although if an objection is raised when an application for a license is made, the Registrar will not insist upon its use.

No information regarding the sale or possible sale of the Registrar's master file is given to license applicants at the time they are asked for their Social Security number.

(1) If this were the situation in your state, would you be uncomfortable with the sale of the master tapes?
( )Yes ( )No
Why?____________________

(2) If you were given full information about the future sale of the tapes when you were asked for your Social Security number, would that be agreeable to you?
( )Yes ( )No
Why?____________________

(3) If the use of Social Security numbers were stopped, would that make you comfortable?
( )Yes ( )No
Why?____________________

(4) What other comments or suggestions do you have? ____________________

Please send the completed form to Alan Taylor, c/o Computerworld, 797 Washington St., Newton, Mass. 02160. Thank you.

Name ____________________

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Letters to the Editor

IBM Part in Nigeria Done 'Watson Style'

I was surprised and pleased to find the article, "Nigeria Boosting DP Training" in the May 16 issue of *Computerworld*. In it there is a brief reference to IBM's African Education Center located at the University of Ibadan, Nigeria, and to the fact the university has just graduated its first class of computer science students.

In the face of all the adverse publicity IBM has received over the years, I feel it is important to expand a bit on that story, since I have personal knowledge of that situation and of IBM's motivation for putting resources into it.

In 1962, the late Arthur K. (Dick) Watson, who for many years headed IBM's World Trade activities, decided it was IBM's responsibility to "do something" for the people of the developing African nations. In typical Watson style, he opted for an IBM-sponsored education program.

This program was full-scale DP training combined with the equivalent of about one year of business administration education. It was my good fortune to be chosen as the person to be sent to Africa to direct that activity for IBM.

The story of how Ibadan was chosen as the site of the center; of the selection of 50 students (out of 5,000 applicants from eight countries) to receive full expenses-paid tuition to the two-year program; of supervising the building of the center; of the tremendous cooperation provided by the University of Ibadan and of various U.S. government and private groups; of the innovative teaching techniques employed there in order to make the program a success; of IBM's successful effort to place the graduates of that program in DP jobs in their home countries; and finally, of IBM's unrestricted gift to the university of a fine, fully equipped DP education center is much too long to tell in this letter.

Suffice it to say that Watson's concern for the developing African nations, as manifested in the IBM African Education Center, undoubtedly has changed the lives of hundreds of Africans.

The obvious question is, what was in it for IBM? If my memory serves me correctly, at the time Watson made that decision, IBM's total revenues from all of the black African countries combined would not have equaled that of the tiniest IBM branch office in the U.S.

Watson's motive was to provide a service, the kind that only a company like IBM could or would provide.

Now, 15 years later, IBM's investment apparently continues to provide benefits in keeping with Watson's and IBM's original intent.

Nate A. Newkirk
Mt. Kisco, N.Y.

'Little Guy' Replies

In his May 30 letter, Robert W. Caugney, vice-president, Applied Data Research, Inc. (ADR), took exception to Michael Hart's comments about National Computing Industries' (NCI) Slick.

It is very interesting to me how the "big guy" starts to squirm when the "little guy" makes big strides (over 300 Slick sales) into his marketplace.

Caugney's assertions were the erroneous ones. The facts are:

First, Community Blood Council of Greater New York, Inc. purchased Slick III on May 21, 1976, when the price was $2,450, not $2,950. This was our Version 2 release, which was not just comparable to, but actually more powerful than the stripped-down version of the Librarian called Librarian/E, which sold for $400 more than Hart paid.

Second, in the May 5 issue of *Computerworld*, NCI announced Version 3 of Slick with prices ranging from $2,450 to $2,950. The $2,450 version (Slick I) still has more power and capabilities than Librarian/E at $2,850, while Slick III at $2,950 is superior to the "full" Librarian at $4,900 to $5,800.

Third, the 20 minutes of ADR technical support service to install Librarian is not comparable to the three days Hart stated, which was not only to install but also to fully convert and become operational.

Fourth, in addition to doing all that the "full" Librarian does, Slick has exclusive features such as dynamic recall, a report writer, multi-level security, complete audit trail facilities, DOS return codes and many others.

I challenge Caugney or anyone else to prove that Slick III Version 3 is not a better product than the "full" Librarian at any price, let alone being $2,000 less expensive.

Frank U. Beck
President
National Computing Industries
Atlanta, Ga.

Thanks for 'Waves'

Your series on "The Waves of Change" by Charles Lecht is very worthwhile. If it had not been for this article, I probably would not have had the opportunity to read it.

I encourage you to continue this type of journalism.

S.W. Logan
Indianapolis, Ind.

A Misnomer?

Now that we've settled the disk vs. disc controversy (IBM uses disk so it must be disk), may I ask if the same solution applies to what I consider a misnomer for a date in YYDDD format?

It seems prevalent to call this a Julian date, yet *Webster's Dictionary* says a Julian calendar has 12 months, each month having 28, 29, 30 or 31 days.

Therefore MMDDYY is a Julian date. The Gregorian calendar modified the Julian Calendar as to when leap year occurred and shortened 1582 by 10 days. Still 12 months.

Why then is YYDDD called a Julian Date? I prefer Ordinal Date (ordinal-a number designating the place in an ordered sequence).

Don Dietrich
Seattle, Wash.

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

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ACPA participates in the Computer Caravan, providing speakers and organizing programs at the various Caravan stops.

ACPA has applied for membership in the American Federation of Information Processing Societies (AFIPS).

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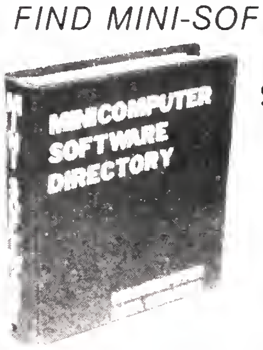

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One Attendee's Viewpoint

NCC: 'The Entire Computer Industry Under One Roof'

By Dennis J. Streveler
Special to Computerworld

If you didn't go to Dallas because you were sure your knowledge of computer technology was up-to-date — you comprehend the subtle difference between the HP 3000 Series I and II, you know an IBM 3330 from a 3033 and you were positive you did not want to see more teletypewriter compatible terminals no matter what the price — you would have been in for a shock. For this was the year of the micro.

Names like Commodore's Pet Computer and Apple Computer's Apple II and the already-venerable Imsai 8080 were bantered about at least as freely as "distributed processing" or "networking" or "subschemas." In fact, last year's conceptual buzzwords were often overshadowed by nuts-and-bolts terms such as the S-100 bus, ROM, RAM and logic modules.

It seems clear the industry is perched atop still another volcano. But this one hasn't erupted yet. Software is still in abominable shape (remember the early mini years?) and many micro peripherals are about as reliable.

Micro vendors apparently need some help from Madison Avenue in retuning their ads away from a bit-byte-baud format to something the mass market can understand.

Still, someone needs to address this question: What *can* these machines do which is useful to humanity? In lieu of an answer to this fundamental question, the only market is status seekers and gadget addicts.

But I doubt whether the American home needs another gadget (I'm still trying to understand why we need trash compactors).

However, everyone does assume — and rightly so — that this cheap computer power is valuable and that it will provide logic for a myriad of personal process control, data collection and home entertainment applications. The technology is here and it is cheap.

We know how to write the software (although probably not exactly to Dijkstra's liking). And there certainly is a plethora of eager vendors and retailers ready to pounce on the unsuspecting marketplace.

When the volcano will erupt is as much a riddle as is when Mauna Loa will pop off. Or when the San Andreas will rid us of the Southern California blight.

Strictly Business

No, the National Computer Conference was not *all* micros this year. In addition to the personal computing exhibits, there was another, larger area of exhibits in a more traditional vein.

But this year there was little excitement, few new announcements and surprisingly fewer gimmicks.

Gone was the Data General organ grinder who stood outside the New York Coliseum on those sweltering days last year. Gone were the speakers of national political consequence such as the then little-known, self-proclaimed technocrat, ex-governor of Georgia who addressed NCC in Anaheim two years ago.

And gone, too, were the booth numbers on the exhibit floor, rendering the exhibit maps virtually useless.

As IBM never truly adjusted to (or seemingly comprehended) the implications of minicomputer technology (IBM was often absent from recent NCCs), the two largest minicomputer manufacturers, Digital Equipment Corp. and Hewlett-Packard, were both conspicuously Awol this year.

IBM touted its System 34. (The most coveted button this year was *Computerworld's* "Pray for IBM." Now I know why.)

The usual pitches on business minicomputers, xerographic printing from mag tape, voice response, COM and replacement peripherals could be heard echoing about the cavernous exhibit floor. (I think CDC can now build a 370 replacement from the ground up, including the "Think" sign.)

My vote for "most exciting new product" goes to Texas Instrument's very impressive (and impressively expensive) bubble memory terminal. Incidentally, TI's chairman, Mark Shepherd Jr., kept the keynote address audience spellbound talking about — what else? — microcomputers and the future.

The conference chairman this year was Dr. Portia Isaacson, whose current profession is — you guessed it — microcomputer retailing.

The jazziest exhibit was definitely Univac's. Its multimedia, real-time animation was delightful. But, quite frankly I can't quite remember which product it was pushing this year. Was it its newly acquired minicomputer line?

The program was, as always, a classic study in overchoice. One normally [illegible] to emulate a time-slicing discipline [illegible] one's own to take in all the "Must" sessions. The program included many well-attended sessions on microcomputers and "personal computing." Surprised?

Reader Commentary

The traditional topics were also discussed, but it is safe to say this NCC was lacking somewhat (by choice, I understand) the trappings of academia.

Not all sessions were of equal caliber, of course. To my dismay, some sessions seemed [illegible] on [illegible] and clearly addressed [illegible] was unheard of in pr[illegible].

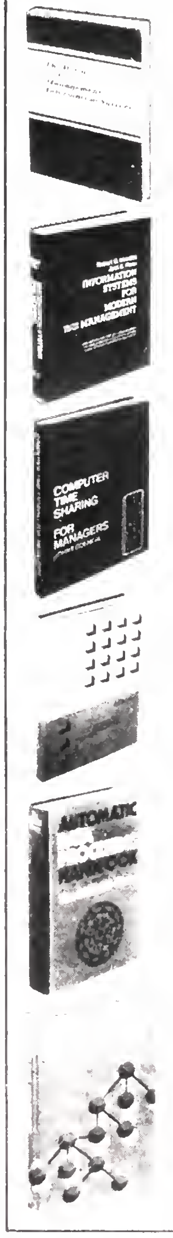
Here are a few [illegible] from the sessions:

• [illegible] seemed preferable to the term "data base administrator." I guess that makes sense, but I've just recently become accustomed to the buzzword "DBA."

• Computer output microfilm technology has been "married" to on-line computer technologies, according to one speaker. A questioner preferred the more descriptive (and accurate) term "shotgun wedding."

• Pioneer Days are always impressive. This year's was even more so. By floating among the exhibits and among the pioneers from Los Alamos, the computer's entire

(Continued on Page 22)



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767/203 DATA PROCESSING MANAGEMENT Methods & Standards by D. H. Brandon, A. D. Palley & A. M. O'Reilly. Pub. price, [illegible] Club price, [illegible]

ENCYCLOPEDIA OF COMPUTER SCIENCE by A. R[illegible] & [illegible]

THE INFORMATION SYSTEMS HANDBOOK by F. W. McFarlan & R. L. Nolan. Pub. price, $30.00

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191/[illegible] BASICS OF DATA COMMUNICATIONS by Electronics Magazine

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P39242

Letters to the Editor

NCC Showed Interest In Certification Low

It is [illegible] evident that I [illegible] at how the computer industry is moving [illegible] on certification when the majority of the [illegible] have very little [illegible] being certified.

Since [illegible] prejudices sometimes [illegible] decisions, I took time out to visit both panel sessions on certification at the recent Dallas National Computer Conference. The two sessions were "ICCP and Certification Move Forward" and "The Certificate in DP Certification Examinations for Programmers" and both were placed in the management segment of the conference.

My reason for sitting in briefly on these sessions was to determine what interest others have and possibly to change my mind on the overall desires of the industry. Both sessions had fewer attendees than any other I attended — I counted less than 100 in one of them.

If there is any interest in certification other than from the academic community, which has a financial interest, I failed to see it at Dallas. A debate was held and no one cared.

So why not let the creative people of this industry work and contribute to their respective companies and selves and stop trying to convince them that they need to "join" something to be worthwhile?

T.C. Bartz
Oshkosh, Wis.

Sources Sought

Many readers of my introductory article on the Cobol Report Writer ["'Report Writer' Reduces Coding, Debugging Task," [CW, April 25] have written to me requesting additional sources of information on the Report Writer.

Unfortunately, I am not aware of the existence of any information on Report Writer other than Cobol compiler implementers' reference manuals. I plan to write a programmer-oriented book on the subject in the future, but that does not fulfill the immediate need.

Should any reader know of a good source of Cobol Report Writer information, please cite it in a "Letter to the Editor."

William R. Englander
San Diego, Calif.

Right on the Mark

I would like to compliment *Computerworld* on Part 1 of the "Role of the Distributor" [Manufacturers Emphasize Significance of Recruitment," CW, June 13].

Speaking from the vantage point of one who has spent the last year bootstrapping a grossly undercapitalized software house into existence, I can testify that the article was right on the mark.

Laurance F. Wygant
Schaumburg, Ill.

NCC: Everything Under One Roof

(Continued from Page 21)

history was visible.

Ed Voorhess, one of the LASL pioneers, describing the IBM card programmed calculator (Jacquard would have loved it), mentioned the fact that it came with a total of eight registers. Yes, eight.

But one could upgrade to a total of 48 by adding modules the size of "ice boxes," each containing up to 16 registers.

Under the same roof one could see the densely packed chips of today and hear predictions of 64K bytes in 8 square inches by 1980.

In the program there were the usual sessions dealing with the relative merits of Codasyl vs. Mumps for data base management, with the value (or lack of same) of the Certificate of Data Processing, and with the (in)security inherent in most operating systems.

Software gurus heard Yourdon and Weinberg and Mills and McCracken. Hardware types were delighted with Amdahl. We were entertained by Herb Grosch and admonished by Jim ("Why Managers Fail") Towsen.

Elsewhere at NCC

You could have loitered, resume-in-hand, waiting to be accosted by a body snatcher. You could have entered the devilish programming contest. You could have visited the Computer Fair and seen a complete computer, along with an impressive array of peripherals constructed completely from surplus and scrap, (i.e., junk).

You could have made the rounds among the hospitality suites after dark — a blessing since Dallas' sidewalks do not roll up after dark, they self-destruct.

The NCC is still the world's best watering hole of ideas, people and machinery — it is quite literally the entire computer industry under one roof.

It is a time of speculation, frustration, contemplation. It is a time of spirited exchanges on most every germaine topic.

I am never amazed when the impressive attendance figures are announced following the closing of the NCC. In fact, I am always amazed that the attendance figures aren't even higher.

See you in Anaheim next June?

Streveler is systems engineer at Straub Clinic and Hospital in Honolulu, Hawaii.

Very little stands between your mini and the disk drives of your choice.

Just Telefile's little Matchmaker disk controller. With it, we can put your minicomputer together with *any* of the latest 3330-type disk drives: Ampex, Memorex, CalComp, Control Data or Diablo. You'll have a system no one else can match.

Greater flexibility.

Special tailor-made compatible interface modules make changing minicomputers a snap.

To change drives, simply switch circuit boards. Capacity can grow from 13.3 million to 1.2 *billion* bytes per system.

Interface software included.

Telefile even provides handlers that make the Matchmaker software transparent to the operating systems of most major minicomputers.

Unmatched features.

Telefile's Matchmaker controller brings to minicomputer users the latest large mainframe disk technology with such features as: *Search and read command* to help you with data base management. *Write protection* to the sector level. And *Advanced error recovery* techniques.

The Matchmaker even comes with a separate maintenance module for offline disk pack formatting and test exercising.

And Telefile stands behind the system not only with hardware and software, but with nationwide service support in major metropolitan areas.

Write for our authoritative book.

100 fact-filled pages on the universal Matchmaker concept including operation, functional specs, features, diagnostics, installation, and maintenance. Get it free by writing: Telefile Computer Products, Inc., 17131 Daimler St., Irvine, CA 92714. Or call toll-free (800) 854-3128. In Calif., (714) 557-6660.

Telefile
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Hewlett-Packard

Computer Advances

Vol. 2 No. 2 July 1977

DS/3000 brings remote computers within your reach

HP plots in its LSI lab

HP 9896- desk top computing for first time users

HP 2640 Series- the polyglots among terminals

What can one HP 3000 say to another?

Plenty!

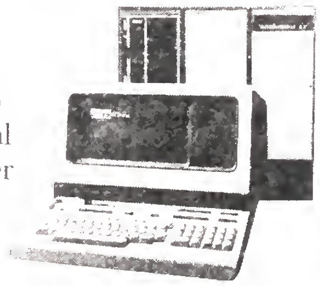
With Distributed System/3000 (DS/3000), it is now possible for one Hewlett-Packard 3000 Series II to communicate with others. A group of HP 3000 systems can now pool and share their resources and data. Plus, a user on one system has access to the capabilities of all ... no matter where the computers are located. In DS/3000, a remote HP 3000 can be just across the room from your local HP 3000, or as far away as standard data communications facilities can reach — across town; across country; across the world. And all this with no significant increase in complexity for the user.

Using a DS/3000 network is straightforward and simple. Programming in a DS/3000 environment is just like programming a local HP 3000. Interactive users and applications programmers do not need to learn new communications commands or do special function programming. To access a remote HP 3000, the interactive user need only add the word "REMOTE" to each command to indicate the system he or she wishes to use. DS/3000 is integrated into MPE II — the HP 3000's innovative Multi-Programming Executive operating system that provides for multiple interactive and concurrent batch operations. With this approach, the same powerful MPE II facilities used for local sessions are also available on a remote HP 3000.

If you can type the word "REMOTE," you can use DS/3000

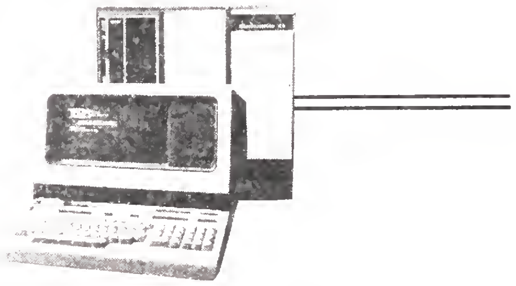
```
:HELLO MIKE.DCA
 SESSION NUMBER = #S91
 TUE, MAY 31, 1977, 10:49 AM
 HP32002B.00.35
          WELCOME TO MANAGEMENT SYSTEM
          ********************************
```

Start a local session
To gain "virtual terminal" access to remote systems, log-on to your local system in the normal manner. Enter the HELLO command.



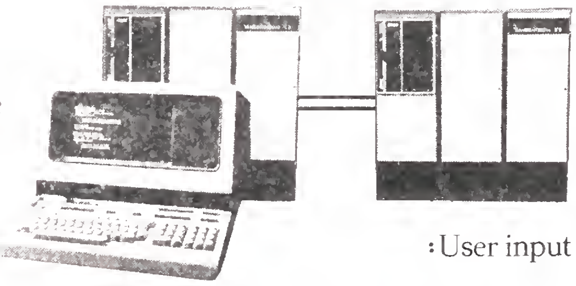
```
:DSLINE PR2
 DS LINE NUMBER = #L3
```

Open a communications line
Use the operating system command, DSLINE, to establish a link with one or more remote HP 3000 systems (either hard-wired coaxial, or public telephone with modems).



```
:REMOTE HELLO MIKE.DCA
 SESSION NUMBER = #S150
 TUE, MAY 31, 1977, 10:49 AM
 HP32002A.01.H+
          WELCOME THIS IS PR2
          **********************
```

Go remote
By using the same HELLO command as before, but by adding the word REMOTE, you start your interactive session on a remote HP 3000. Now, all the powerful MPE II commands are available for you on both the local and the remote HP 3000 Series II. Your terminal conveniently serves as "virtual terminal" for both.



: User input

MPE II also brings an accounting structure and file security that provide protection against unauthorized use of local or remote HP 3000 systems and their data files.

DS/3000 networks strategically disperse computing power wherever day-to-day work is being done. They implement in hardware and software the organizational communication lines that already exist among the people of a company. The result is computer processing and data communication mapped onto existing company structures, with a lot of timely and accurate information flowing back and forth.

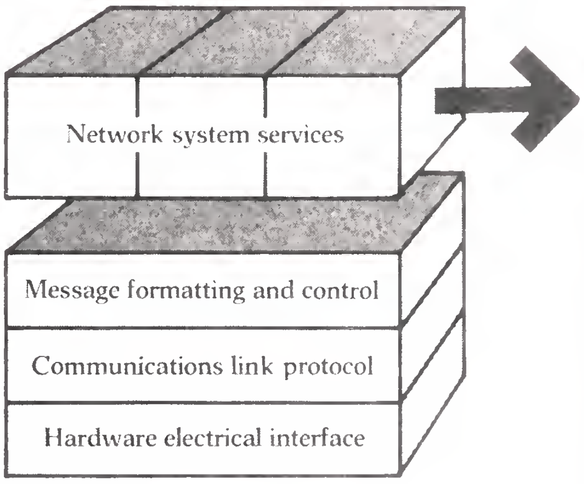
DS/3000 software costs $9,000* for each HP 3000 in the network. System prices start at $110,000.* **For further information check A on reply card.**

Layered implementation

Computer users want high level network capabilities that do not require specially trained professionals in data communications. A logical way to accomplish this is to integrate data communications into the operating system and provide transparent access to remote processing and remote facilities. Complex requirements of the data communications environment, such as modem and line control, error checking, and recovery, should be handled by vendor hardware and software and should be invisible to network users.

This principle guided the architectural design of DS/3000. DS/3000 software is organized into structural layers so as to separate matters of routine from matters of user concern. HP software and hardware automatically handles the first three layers.

Accommodate new technology
Technology in communications is rapidly changing. HP is committed to bringing these advances to customers. A layered approach facilitates this. Each layer to a large extent functions independently. HP can make network enhancements to DS/3000, for example, a new line protocol, by providing a new software/hardware update to one layer. This change does not affect either the structure or the usage of DS/3000. HP can move with industry technology. The customer simply purchases a software upgrade or new hardware interface. Applications and programs need not be changed. With DS/3000, users have today's and tomorrow's communications.

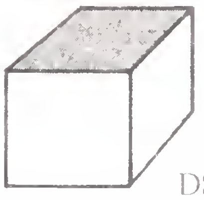


The layers
The first layer, the electrical interface to external modems, meets EIA RS-232C and CCITT standards. Systems can be linked over common carrier facilities at speeds up to 9600 bits per second or over hardwired lines (coaxial cables) at line speeds up to 2.5 million bits per second.

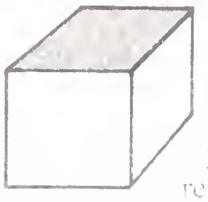
The next layer is concerned with link protocol in a point-to-point configuration. It concurrently multileaves data bi-directionally over half or full duplex common carrier facilities using IBM-compatible Binary Synchronous Communications (BSC) protocol.

The third layer automatically handles conventions of message formatting and manages the flow of messages between systems. Here HP designed its own standard format.

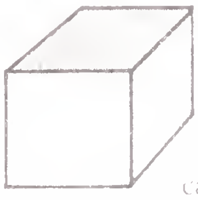
The top layer is the most exciting, for it represents the set of full, high-level system services available to the user on DS/3000.



Interact Locally and Remotely
The remote command processing capabilities of DS/3000 make it easy for interactive users of a local HP 3000 to utilize that same set of capabilities on a remote HP 3000. The local terminal becomes a "virtual terminal"; with it the user has full use of a remote system as if it were local. That includes all MPE II commands, language and utility subsystems, and remote user applications programs.



Share A Resource
MPE II treats all devices as files. With DS/3000, you have full remote file access to all devices and data files on another HP 3000 (after validating your authorization, of course). Smaller HP 3000 sites in a network can share the processing power of a larger HP 3000 using its software subsystems or a variety of peripheral devices. Simply expand the MPE II FILE command to identify the remote system. No application reprogramming is required.



Communicate Program to Program
With DS/3000 separate applications programs running in separate systems can directly and efficiently exchange data and control information with one another, thanks to a set of nine new easy-to-use program callable procedures. Program to program communications facilities also allow one user program to initiate or terminate programs on remote systems.

*U.S. domestic prices only

It's 2 pm Thursday in San Francisco, 5 pm Thursday in New York, and 8 am Friday in Tokyo

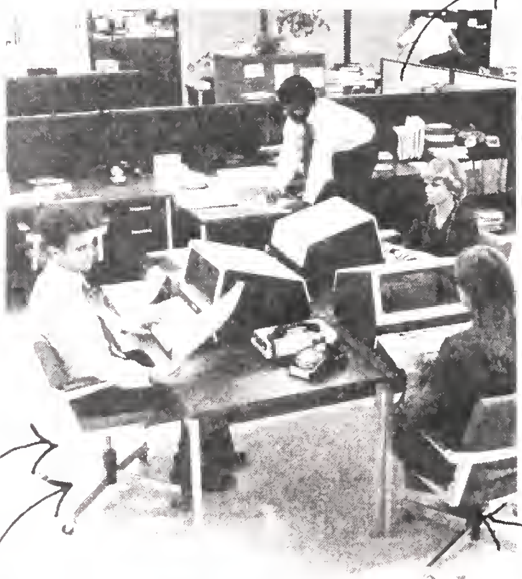
Glimpses of an HP distributed system

HP 3000
Sales Office
Tokyo

On a daily basis, the field transmits customer **orders** to the San Francisco factory and New York warehouse. In return, latest factory order **status information** is updated to sales office's files so customer credit checks and factory **acknowledgments** can be made on-line.

HP 3000
Service/Parts Warehouse
New York

The warehouse validates Tokyo's **orders** against on-hand quantities and generates shipment documents while updating inventory status.



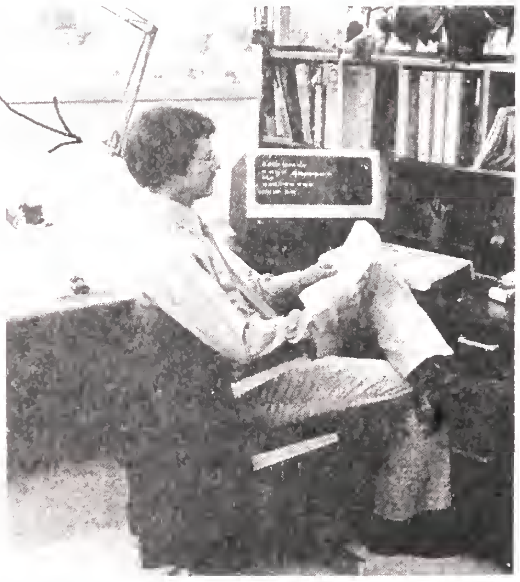
HP 3000
Financial Control
San Francisco

The latest **master production schedule** is used to generate the company's next period's financial plan.

Product costing results are reviewed to evaluate latest **engineering data control** changes.

HP 3000
Order Administration
San Francisco

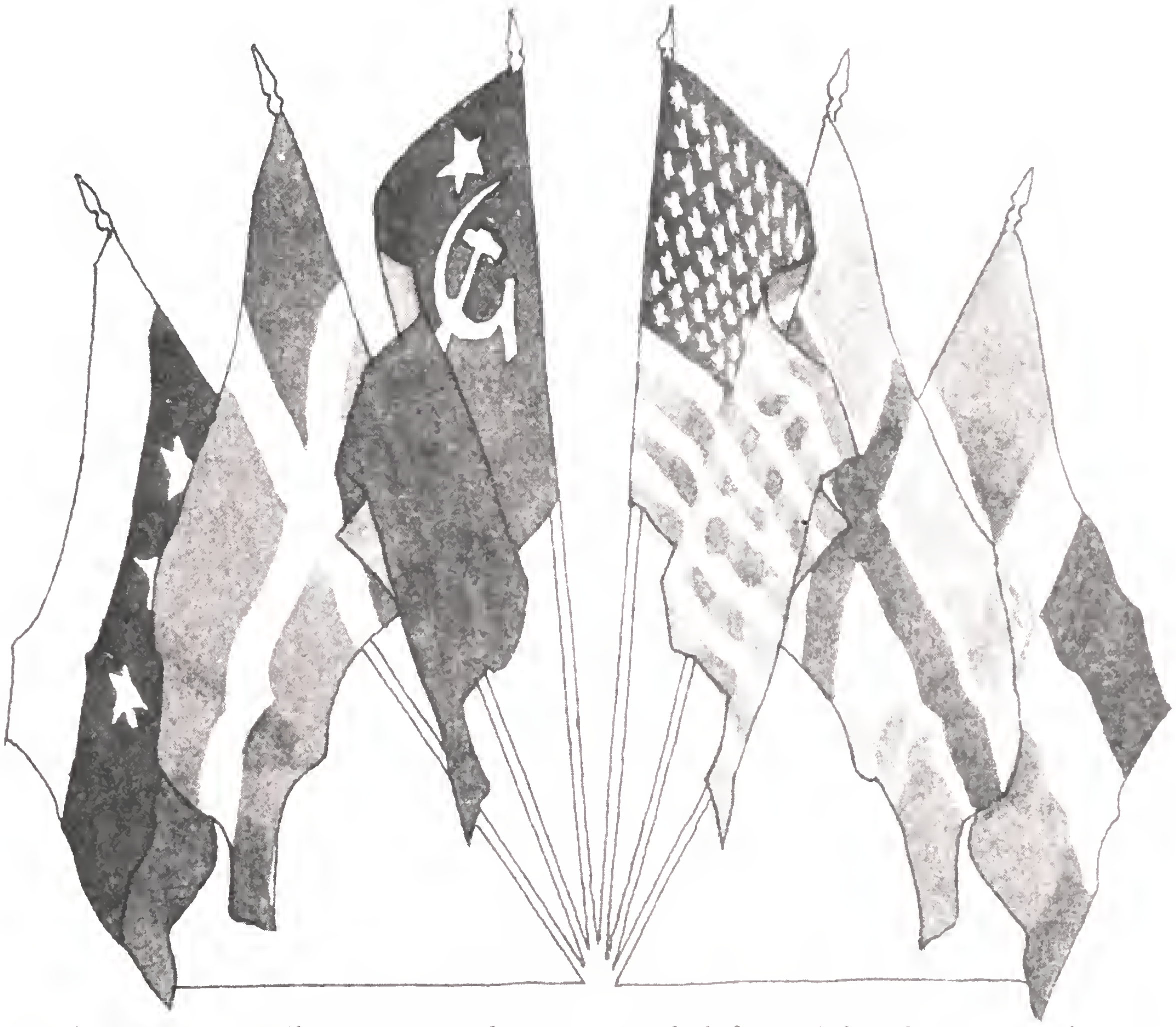
The factory allocates **master production schedules** to customer **orders** and transmits updated **information** to sales offices. For example, Tokyo's customer ship dates are **acknowledged**. While monitoring order statistics, the **master production schedule** is prepared using forecasting information and current backlog data.



HP 3000
Engineering/Manufacturing
San Francisco

Prior to exploding the master production schedule, the engineering staff makes changes on the **engineering data control** system.

HP terminals overcome the language barrier



Being an international company involves more than maintaining overseas operations. It means being sensitive to language, cultural, and social differences.

The sophisticated HP 2640 series terminals respond to one of those differences — language.

Functional modularity

To simplify implementing new languages, HP localized all the language capabilities on just two character set modules. These modules provide all the capability to use concurrently a combination of four sets — 128 characters each. Characters from bilingual sets can even be displayed adjacent to each other.

Hardware modularity

A single bus is common to all logic modules. Therefore, any module, including those that control the character sets, can plug into any slot in the bus. Any combination of enhancements (more display memory, cartridge tape units, printer capability, or data communications) can be added by simply plugging in the appropriate logic module. For easy repair, just open the terminal, pop out the board, and pop in a new one.

Microprocessor control

All 2640 operations, for example, memory allocation and data communications, are microprocessor-controlled.

This microprocessor also controls the keyboard. Key functions are independent of their respective position on the keyboard. With this approach, engineers can easily accommodate not only the unique character sets of different languages, but also preferred keyboard layouts.

New Arabic terminal

A new terminal, the 2645R, displays both Arabic and Roman characters. Special design considerations were encountered in implementing the Arabic language. First, the characters had to be aesthetically pleasing, readable,

and correctly drawn to capture the script-like Arabic style. A character set allowing for horizontally continuous characters was designed.

Also, since Arabic reads right-to-left, while the Roman language reads left-to-right, the terminal required a special selector switch to provide both capabilities.

For more details on the 2640 series international terminals, check B on your reply card.

Small and powerful

A life-size section of an intricate, computer drawn plot used in the design process of Hewlett-Packard's new CMOS/SOS single chip 16-bit Micro-CPU.

The XYZs of plotters

We needed a plotting system for our Large-Scale Integration design facilities in Cupertino, California. Our choice: Gerber Scientific Instruments' Superplotter, driven by their choice, an HP 21MX computer.

This computer-controlled plotter draws the line on expensive hand artwork. It offers design engineers the benefits of computerized plotting: flexibility, accuracy, economy, easy interface, and quick turnaround. The heart of the Superplotter, the HP 21MX coordinates and optimizes the plotter's performance to achieve dramatic 0.004 inch accuracy, 42 inch-per-second speed, and 2.8G acceleration.

Automatic drafting machine throughput for most drawings is primarily a result of such high acceleration and speed.

Actual size of HP's Micro-CPU Chip. To ensure exactness of detail, one-ninth of this surface is plotted on a 2½ foot square.

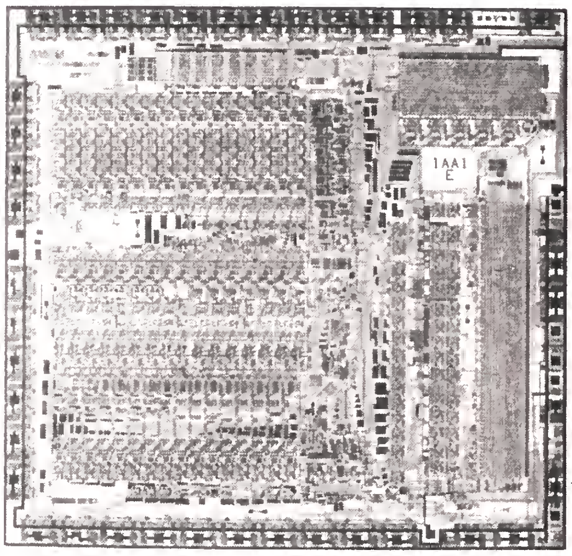
Precision in miniature

In sophisticated integrated chip design, precise measurement and fast throughput are critical for producing mask level artwork.

In our LSI lab, a technician uses a computerized digitizer to produce artwork for the masks of a new chip. Masks are glass plates, each containing the details of one of the chip's eight thin layers.

The technician then loads data corresponding to that particular drawing into the plotter system. Each line is plotted in one of four colors, depending on the material shown.

The finished plot is compared to the hand drawing to verify accuracy; then it's on to manufacturing.



An enlarged photograph of the MC^2 Chip.

Hewlett-Packard's MC^2 chip

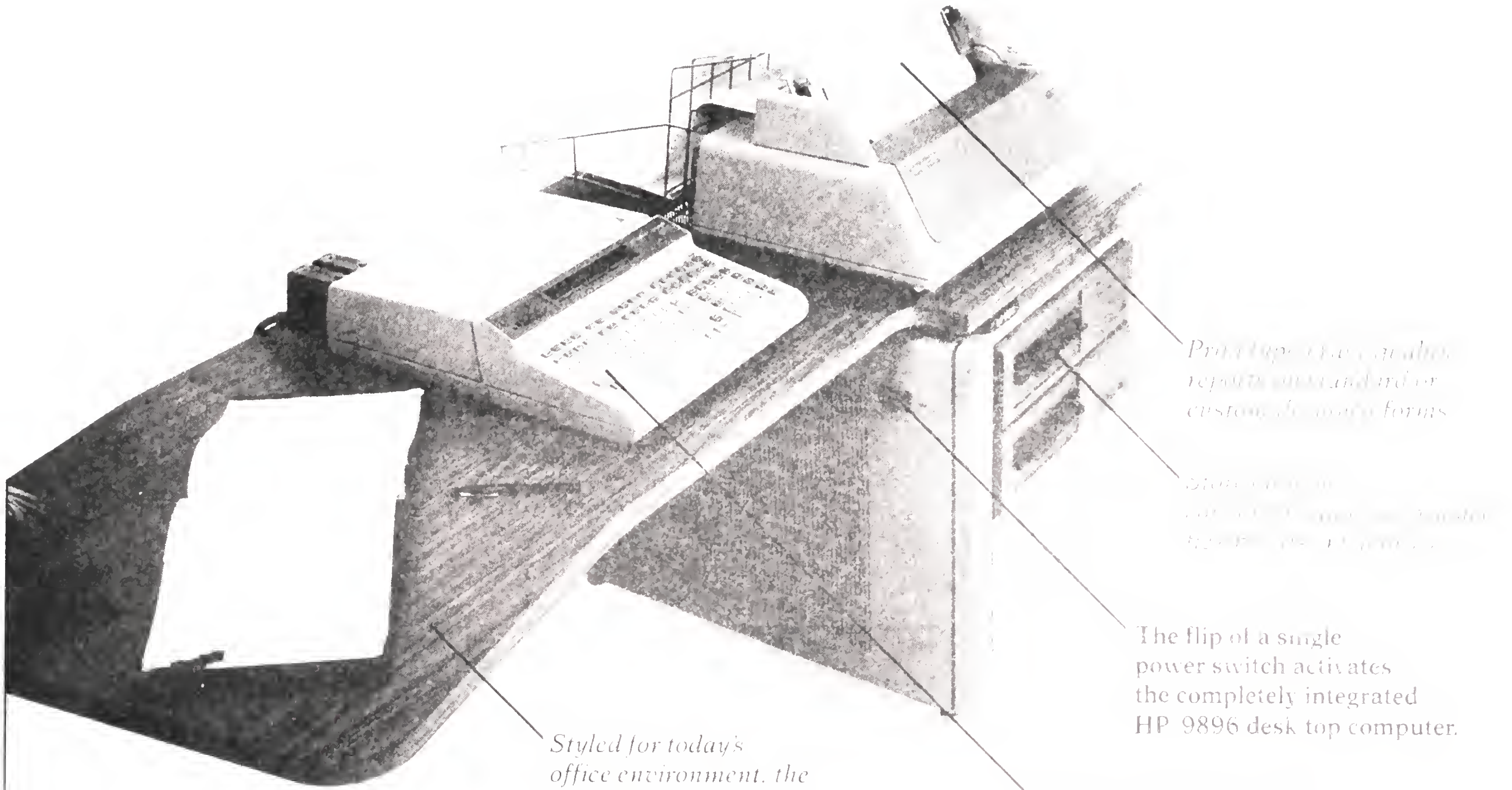
HP's Micro CPU Chip (MC^2) is based on silicon-on-sapphire technology with complementary metal-oxide-semiconductor processing (CMOS/SOS).

With SOS technology, new designs are possible, with far more favorable trade-offs between high speed and low power consumption.

SOS provides superior dielectric isolation, thus circuit elements can be very closely spaced. In only a $34mm^2$ area, MC^2 is a complete 16-bit parallel microprocessor that contains 10,000 transistors.

The MC^2 executes 34 classes of 16-bit instructions and is capable of performing a full register-to-register addition in 875 nanoseconds. Power consumption is typically 350 milliwatts.

Check C on the reply card for more information on CMOS/SOS.



The HP 9896 computational system

With the HP 9896, small businesses and first-time computer users have general computational power right at hand, and in their control. Easy to program in BASIC, the HP 9896 has extensive editing capabilities, and programs can be custom tailored to commercial uses: finance, manufacturing, distribution, and sales.

Scientific and engineering applications

The HP 9896 is also a powerful resource for scientific and engineering applications that require analysis and manipulation of technical data in medium-size data bases.

For more advanced applications, the HP 9896 system includes peripheral options — a high-speed (200/lpm) printer and a matrix plotter, for example. You can also expand the memory in increments of 8k bytes up to 32k bytes.

Double density discs

To put more data on-line, HP innovated flexible discs with twice the density of previous industry standards. Each holds nearly 500,000 bytes of information, and as many as four flexible discs can be supported by a system at once, for a total on-line capacity of almost two million bytes.

Full price for the HP 9896 system hardware is $18,700.* HP has an OEM quantity discount schedule. **If you wish further information on the HP 9896, indicate D on the reply card.**

*U.S. domestic prices only

Automate financial accounting in as few as five days*

The HP 9896's new business information management system helps companies with annual sales of $250,000 to $10,000,000 establish their own EDP facility. FICS (Financial Information Control Software) is a complete package of programs to handle general ledger, payables, receivables, payroll, and inventory. Further, HP has an innovative five-day conversion plan that enables qualified* customers to switch over quickly from their manual or ledger card systems.

For larger businesses, the HP 9896 system can also handle selected tasks in such areas as production control, financial analysis, forecasting, and personnel records management.

The Hewlett-Packard customer is assured of a single responsible source. The completely integrated hardware and software package — the HP 9896 and FICS — costs $21,700* and includes installation, conversion, and training. The total system leases for approximately $500/month including maintenance. **To learn more about this advance, indicate E on the reply card.**

*Offer available in the U.S. only; contact your local sales office for more details.

New & Noteworthy

Incremental growth: two Hewlett-Packard products help you grow "byte by byte."

Upward compatible RTE-M

RTE-M is Hewlett-Packard's newest Real-Time Executive operating system for HP 1000 systems and 21MX family computers. Memory-based rather than disc-based, RTE-M is suited for dedicated applications that require fast response time in collecting and controlling data. Minicartridges or flexible discs may be used for program and data storage.

Versatile RTE-M is upward compatible with HP's broad family of larger disc-based systems — RTE II and RTE III. HP lets you choose the system that's right for your present application: and you can expand without high conversion costs or retraining.

RTE-M is available in three modular versions — MI, MII, and MIII — depending on your requirements and hardware resources. RTE-M software is priced at $1750.* **Check F on the reply card for details about RTE-M and RTE II/III.**

DISCoveries

What can be stored on fewer than 100 megabytes of disc memory? (a) The Encyclopedia Britannica from Aardvark to Mustard (b) Enough typed characters to span the Golden Gate Bridge 25 times (c) A month's data for an [illegible] operations of a firm with over 400 employees, 52 products, and annual shipments totaling $42 million.

Guess again. The correct answer is A, B, *and* C. Two 50 megabyte discs offer more memory than you may realize.

Let's visit the company mentioned in "C." Surprisingly, 100 megabytes — the equivalent of two formatted HP 7920 discs — can store much more than the materials control and accounting data bases. There's also system software, applications programs, and plenty of room for growth.

Look at some of the data processed during a typical month:

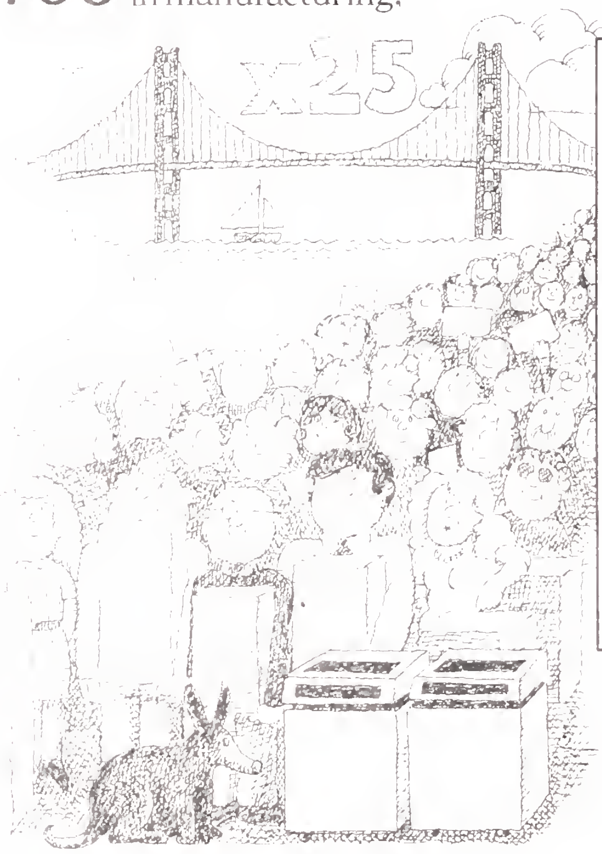
1200 checks written in accounts payable;
17,000 material vouchers and
4000 labor vouchers processed in cost accounting;
1500 purchase orders and
700 work orders processed in manufacturing;

not to mention daily status reports on inventory levels, backorders, and product activity for **5000** different parts. Remember. . . all these data, and more, stream from fewer than 100 megabytes.

This company's disc storage is part of an HP 3000 computer system which utilizes the IMAGE data base management package. The HP 7920's function as integral parts of a totally on-line, integrated system, for a current and close-at-hand data base. Six more HP 7920's — another 300 megabytes — can be added to the original microprocessor-based controller for a total of 400 megabytes.

The HP 7920 add-on multispindle version is $14,000, or two for $26,000.* **Check G on your reply card for details.**

*U.S. domestic prices only



Computer Advances, written to inform professionals of the latest technical contributions from Hewlett-Packard's engineering labs, appears regularly as a compilation of product and customer innovations.

You are invited to receive issues at your place of residence or business. Write Computer Advances, Editor, Hewlett-Packard, 11000 Wolfe Rd., Cupertino CA 95041.

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SOFTWARE SERVICES

Despite 'Lines/Day' Drop

Univac Team Gains Most From On-Line Programming

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. — It is hard to quantify improvements in programmer productivity attributable to the use of various tools and techniques now available, and improvements don't always live up to expectations. However, the new approaches are worth using, according to Neil Gorchow.

A vice-president for product strategy and requirements at Univac, Gorchow told a session of the recent National Conference on Computer Systems Productivity of a project at Univac in which a combination of tools and techniques were introduced to enhance the programmers' performance.

Overall, the development team did better in many respects than it had when the new approaches were not being used. But, he added, the project still required 50% more effort than had been initially budgeted for it.

Univac, like most vendors and many users, "spends a fortune on software" every year, he said, and this particular project was expected to be substantial, requiring 100 man-months of work.

That estimate took into account gains the company thought it would get from the use of interactive rather than batch-oriented programming environments. It also took into account top-down design and implementation, design reviews, structured programming techniques and the use of higher level language with code reviews.

Determining Effects

The introduction of so many new factors made it slightly difficult to determine the effect of each, but Univac had built up a long file of information about the performance of individual workers on previous projects. This served as a reasonable base for comparison, Gorchow explained.

His notes failed to indicate the nature of the project, but, he said that was relatively unimportant; the estimates were based on whatever the work was to be.

In any case, by the time the project was finished it provided some mixed results — not the least of which was the need for 150 man-months of work to get it done.

The interactive programming environment provided the greatest boost to productivity, he said, perhaps because of the unexpected boost in the development team's morale. In the old batch mode of operation, team members were promised — and generally received — two "shots" a day on the system.

Working at the CRTs, they were free to access the system whenever they wished. By the time the project was done they averaged four or five shots a day, Gorchow estimated.

Although Gorchow claimed a 20% gain from use of on-line program development, he later mentioned that the "lines of completed code/day" productivity measurement actually dropped on this project from 8 to 6.5. This was confusing to those running the project since they expected the count would go up in the new environment.

But Gorchow gave a clue on what may have happened when he noted the design reviews were "very helpful" because they avoided errors [where the] project was headed. Despite the dropback in lines completed, the end product was done sooner than it would have been if the old techniques had been used.

And, Gorchow emphasized, the stability of the finished product was greater than expected — "probably because the end users understood what they had, thanks to the design reviews."

The use of higher level language — Plus, in this case — provided the second greatest improvement in productivity, but the Univac official admitted he was disappointed the gain from this area was only 10%.

Working with the more English-like wording of this coding "drastically reduced errors and eased debugging," he said. "It also divorced the implementation from direct hardware considerations."

The use of top-down design and implementation techniques was the third most significant factor in this project, he continued, noting it "forced a foreknowledge of purpose, forced modularity and minimized integration problems."

In fact, however, the real impact of top-down design and structured programming could not be measured at development time. If all goes well, the payoffs from these approaches will show up more in simplified maintenance than in simplified original coding, he explained.

'JCLMacs' Standardizes OS Job Stream

VALLEY FORGE, Pa. — JCLMacs from Management and Computer Services, Inc. (Macs) was developed as an aid in producing completely standardized JCL statements for IBM OS or OS VS environments. The ouput is so standardized, "it really is pretty," according to a Macs spokesman.

"Prettiness" is immaterial, of course, but he claimed the standardization is useful as well. It means that systems programmers, for example, can review procedure libraries easily when changes that may affect numerous systems are being considered, he explained.

The package can be run on any computer with enough memory and an ANS Cobol compiler, he said. It will accept OS JCL utility control cards and JCLMacs cards intermixed to produce output in the same sequence as the input, substituting generated JCL for the JCLMacs cards.

A listing is produced showing each input card and the output generated from it. Errors are indicated by asterisks under the incorrect data and output JCL is formatted into a standardized alignment and may be sequenced in columns 73 to 80, the vendor said.

If SORT is specified as the program to be executed, DD statements for all data sets except SORTIN, SORTOUT and SYSIN will be generated by the system, the spokesman noted.

JCLMacs includes a table-driven facility so frequently used JCL can be generated without coding JCLMacs cards. They can be extracted from the table and added to a procedure by a simple reference to its number in the table, he explained.

The package uses 65K bytes in an IBM DOS environment but, since Cobol source code is provided, it should be able to run in any comparably sized CPU that supports Cobol, he added.

The software costs $1,000 from Macs at 790 Valley Forge Plaza, Valley Forge, Pa. 19482.

'Easytrieve' Code Studies SMF Data

OAK BROOK, Ill. — Pansophic Systems, Inc. has begun distributing an SMF reporting system for IMB OS VS1 users built around Pansophic's Easytrieve package.

The enhancement — free to Easytrieve users — organizes an SMF variable block data base into a "more easily handled" fixed block format, the company said.

The reporting system is made up of five Easytrieve programs that produce the reformatted SMF data base and two more programs that generate daily and periodic reports, including file management information, a spokesman explained. The system deals strictly with Type 4, 5, 6 and 20 SMF records, he added.

The formats provided can be adapted to users' special report headings and various accounting needs. Any job or job step can be singled out for analysis and, since the created file is sequential, it is easy to use.

While the SMF reporting system is available to all current Easytrieve users, it is also ready for distribution to new users of the $15,000 package, Pansophic noted from 790 Enterprise Drive, Oak Brook, Ill. 60521.

Use of Fortran as Source Code Lets DBMS Run on 'Any CPU'

PHILADELPHIA — Seed, a low-cost "Codasyl-type" data base management system (DBMS), was written primarily in Fortran so it could be installed on "virtually all machines," according to the vendor, International Data Base Systems, Inc.

While many DBMS cost so much they must be used across a spectrum of the user's applications, Seed can be justified on the basis of a single application, the vendor claimed.

The $7,500 software includes both a data definition language to specify what goes into the data base and a data manipulation language (DML) to work with the data once it is in place. Seed's DML can be used from Cobol or Fortran programs, a spokesman added.

The system supports network, hierarchical or network data structures providing both schema and subschema views of the data, as defined by Codasyl. Changes in the data or in relationships would require restructuring of the data base, but changes in the user's view of the data can be provided by each creator of these subschemas. In either case existing programs are not affected by changes in the data, he said.

Optional Extension

The DML facility can be extended with an optional interactive interface called DBLook, which serves three purposes. First, it allows the user to build a custom query language to support immediate retrieval of data, the spokesman explained.

But it also allows the user to examine the structure of the data base itself, to better understand what data types and relationships, for example, are being used.

Finally, DBLook also provides an interactive "HELP" facility to explain commands to the user, he added.

Seed has already been implemented on IBM 370 and Digital Equipment Corp. Decsystem-10 systems.

The base DBMS costs $7,500 or $375/mo., the vendor said from Suite 252, 3508 Science Center, Philadelphia, Pa. 19104.

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UK-Built 'Necol' Eases Neat/3-Cobol Conversions

CLECKHEATON, England — The Neat/3 to Cobol Language (Necol) converter developed by Computer Facilities Software Ltd. (CFSL) is now available in this country and will be available in the U.S. once an agent is selected, according to a CFSL spokesman.

The software is said to provide direct disk-to-disk conversion of source programs written in NCR's unique Neat/3 language, recoding them in code compatible with the 1974 ANS specifications for Cobol which can then be compiled on NCR's 8000 series or Criterion CPUs.

While conversion is under way, Necol produces a source listing of the Cobol statements being produced. Any Neat/3 statement that cannot be converted is identified on the listing and carried to the new Cobol program file as a comment line, so the user can see what work still has to be done manually.

Nonconversion occurs particularly when Necol encounters "Level 2" instructions, the RELINK tag and chained disk files, the spokesman noted, since there are no corresponding Cobol facilities for these Neat/3 capabilities.

In addition, he said, all printer records, work areas and WRITE statements must be recoded by the user because of differences in Neat/3 and Cobol handling of such things as spacing before or after printing.

PERFORM statements "must be closely reviewed" because of differences between that Cobol instruction and the Neat/3 LINK. Numeric literals are converted with enclosing quotation marks which must be removed in Cobol, he added.

More information about the software or about the agency arrangement the company would like in the U.S. is available from CFSL, Braemar House, Snelsins Road, Moorend, Cleckheaton, West Yorkshire, England.

More Cobol Soon

DAYTON, Ohio — NCR Corp. has released an ANS Cobol 74 compiler for use with the N[illegible] models of its 8000 series CPUs. Compatible compilers for [illegible] are being released [illegible] a spokesman [illegible].

[illegible] the 8000 [illegible] Neat VS [illegible].

[illegible] the NCR [illegible] Cobol 74 compiler [illegible] N-8350, N-8450 and N-8[illegible] as well as the older [illegible], the spokesman said. [illegible] required for [illegible]K [illegible] of memory, [illegible] tape or cassette [illegible].

The N[illegible] Cobol compiler will be available [illegible] monthly license fee [illegible].

'Alice' Shifts CICS Macros to Command Format

HAWTHORNE, N.J. — Designed to help convert the macro-level coding required by earlier releases of IBM's Customer Information Control System (CICS) to the command-level mechanisms available under CICS/VS Release 1.3, the Application Language Interface Conversion and Extension (Alice) system has been introduced by On-Line Software International (OSI).

The software works as a batch mode precompiler run. It accepts the user's Cobol source program as input and generates a new source program updated in the way it interfaces with CICS but undisturbed in its basic logic, according to an OSI spokesman.

The macro coding is converted to command-level instructions whenever possible, he said, and when a change cannot be made — some of the macros have no equivalent in the new command structure, he noted — the remaining macros are flagged on the program listing which is also generated.

Leaving macros in place does not affect the program since CICS 1.3 accepts them as easily as it accepts the command formats, the spokesman claimed. The changeover is made, when possible, primarily for the convenience of the programmer, he said.

Obviously the conversions could be done manually, he admitted. By putting Alice to work however, an installation's entire conversion can be handled quickly and uniformly, he claimed, relieving the local staff of the effort and the need to maintain two different environments, as would be the case if manual conversion took a lot of time.

Alice will be available Aug. 1 for $750, but requests for the package received prior to that date will be discounted 20%, OSI said from Suite 208, Software Plaza, Hawthorne, N.J. 07506.

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WANG

'SAS' Eases Load Module Chores

RALEIGH, N.C. — Release 76.5 of the Statistical Analysis System (SAS) software is said to provide "substantial savings" for IBM OS/VS users that need to copy load module libraries to disk or tape. The PDSCOPY procedure eliminates the need for relinking and provides reblocking as it copies, according to the SAS Institute.

SAS is a unified system for data management, statistical analysis and report writing, a spokesman explained. The PDSCOPY feature can save users 13% to 18% over conventional methods of copying load modules, he claimed, adding it would be of immediate use to installations upgrading to IBM 3330 or 3350 disk packs.

The updated system also supports tape-based SAS data sets, time and date functions and a procedure to produce overprint contour plots. A format procedure to print value labels and statistical procedures for outputting selected percentiles and for performing one-way non-parametric analyses are also part of Release 76.5, the spokesman said.

Written in Assembler and PL/1, SAS runs in batch or TSO modes or in autobatch under Hasp and requires a user region of 150K bytes. It can be used on IBM 360/370 or plug-compatible machines.

The software is available as a one-year renewable lease with a first-year cost of $2,500.

The SAS Institute can be reached through P.O. Box 10066, Raleigh, N.C. 27605.

'Reccon' Monitors Data Base Duplicates

LEXINGTON, Mass. — The Reccon package enables users working with data base management systems or central information files to recognize and consolidate duplicate accounts, according to the vendor, Systems Design & Implementation, Inc.

Many organizations, including banks and hospitals, may wish to allow separate accounts to cover separate types of services, for example, but still maintain centralized awareness of all accounts that pertain to one person or customer. Reccon supports that need specifically, a spokesman said.

In reviewing files, the package identifies those customer names and addresses most likely to be duplicates. They are displayed to a clerk with an "optimum choice" selected by Reccon based on both account and customer identification data.

Typically, the clerk needs to make a different choice in only 15% of the cases, the spokesman said.

Reccon is written largely in Cobol and runs in "about 100K" on IBM gear, but has been installed on Burroughs and NCR mainframes as well, he added.

The software costs $30,000 plus installation charges the first year and $12,000/year after that. Installation charges generally are about $6,000, the company said from 20 Lillian Road, Lexington, Mass., 02173.

Linear Programming Extended on UCS Net

KANSAS CITY, Mo. — Two linear programming systems — the Advanced Linear Programming System (Alps) and Transportation, Allocation or Distribution (Trad) — are available through the Uninet remote-computing network of United Computing Systems, Inc. (UCS).

Alps applies to production scheduling, investment analysis, industrial management, process control, capital planning and task allocation problems in which any or all the variables may be restricted to integer values.

Trad was designed for optimizing industrial processes involving the transportation, allocation or distribution of products, UCS' business/financial product manager said from 2525 Washington, Kansas City, Mo. 64108.

'DCS' on First Data Net Aids Study of Mechanisms

WALTHAM, Mass. — The Dimensional Computation System (DCS) now available on First Data Corp.'s remote-computing network makes mathematical models of "almost any kind of two-dimensional mechanism or assembly of parts," according to a spokesman.

The system includes a language for describing how the parts of assembly are attached to one another. The important features of the individual parts are also described in a very simple way, relieving the user of having to do any arithmetic or trigonometry, he added.

Headquarters for the nationwide First Data network is at 40 Second Ave., Waltham, Mass. 02154.

Fortran Tests Offered

User Involvement Called Key to Compiler Validation

By Edith Holmes
Of the CW Staff

DALLAS — Validation services and standards for software must go right down to the user level or they won't do any good, Patrick M. Hoyt of the Federal Cobol Compiler Testing Service told a recent conference audience here.

In an effort to encourage users to participate in a developing Fortran compiler validation system, Hoyt offered to test any compiler a user sends him for conformity to American National Standards Institute (Ansi) specifications.

Software standards are the only reasonable means of bringing down software conversion costs, Hoyt believes. "Standards issues have to be hit hard — by users" if the community is to put an end to dumping huge amounts of money down the conversion drain, he stressed.

The Navy's Fortran validation program measures a compiler's conformity to Ansi's 1966 Fortran standard, X3.9, he noted. That standard is currently under review by the voluntary body's Fortran standard committee and users will soon have another opportunity to comment on the 1977 update of X3.9, Hoyt said.

Procurement Aid

Containing Fortran programs, subprograms and an executive routine, the validation system is intended to help the government procure standard Fortran compilers in hopes of developing interchangeable programs which would, in turn, reduce expensive system conversions, Hoyt explained.

Hoyt believes the validation service has already proved to be "a useful procurement tool." And the improved performance of Fortran compilers will enable the programs produced by them to make the jump from one machine to another more easily, he said.

"If vendors tested their software adequately, we wouldn't need to run the validation service," Hoyt stated. "We could accept programs and compilers on blind faith."

Vendors' cooperation in testing and debugging their software has improved since the government began its validation services, first in Cobol and now in Fortran, Hoyt added.

In constructing its validation system for Fortran, the Navy concentrated on writing "positive tests," he assured his audience. The service is strictly a syntactic and semantic test of the language elements contained in and defined by the Ansi standard.

The service's information tests were initiated to be of help to users. The system tests neither vendor extensions of the Ansi specifications nor compiler or object code efficiency, Hoyt stressed.

Basic Service Coming

The Navy has gained considerable experience in running the validation services [illegible]. A system for Basic is now in [illegible] form and will be ava[illegible] the near future, he indicated.

While he chastised users for their lack of involvement in software standard-setting, Hoyt praised Ansi's Fortran committee for its dedicated work in the last 11 years. The National Bureau of Standards (NBS) has also made considerable contributions in the area of federal standards, he [illegible].

NBS [illegible] [illegible] [illegible]

We need [illegible] [illegible] conform[illegible] [illegible] Fortran [illegible] programs.

Ans[illegible] [illegible] copy for [illegible] [illegible] vision of the 1966 Fortran standard [illegible]

Continued on Page 36

Correction

The Fortran program developed to calculate the economic thickness of industrial insulation [CW, June 13] costs $60, according to a spokesman for the Thermal Insulation Manufacturers Association, 7 Kirby Place, Mt. Kisco, N.Y. 10549.

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Measurement Can Be Based on Local Needs: Stimler

By Ronald A. Frank
Of the CW Staff

PHILADELPHIA — The difficulty in measuring the performance of a DP system comes from the lack of an accepted standard of measurement according to Saul Stimler, president of Stimler Associates.

Productivity or performance measurements must be geared to individual systems; it is up to the user to first decide what given workload is to be expected from the system, Stimler said here recently.

After that, he noted, there is a guideline against which to measure whether the desired results are being achieved.

The workload of a typical DP system is usually based on the amount of work it can and should complete in any given work day and its ability to complete individual jobs in a timely manner, he pointed out.

It is best for the user to establish a representative workload that can be an expected mix for a given day. This should include a multiple mix of transactions processed by the system and take into account traffic peaks, Stimler said.

"Since there is no universal unit of work, you can only relate a certain workload to a specific system," he added.

To determine the maximum limit of a system, it is usually possible to calculate the maximum jobs per hour that can be handled to meet the required turnaround time. Once this has been determined, the user will have a good idea of which part of the system will be the first to become deficient, he said.

Stimler said that monitors, both hardware and software, are tools for the user to determine how much of the total available resources is being utilized at a given point. This process will also help to determine which resource will become saturated first if the system keeps running similar job mixes, he added.

The goal of performance measurement should be to find methods by which the system can do the same amount of work in less time; alternatively it should provide answers on who the system can take on new tasks in the same time, Stimler said.

Meeting these goals means the user is optimizing the performance of his system, he stressed.

The user should carefully analyze the system before beginning a measurement project. A common dictionary of terms should be agreed upon so there will be no semantic differences, Stimler suggested.

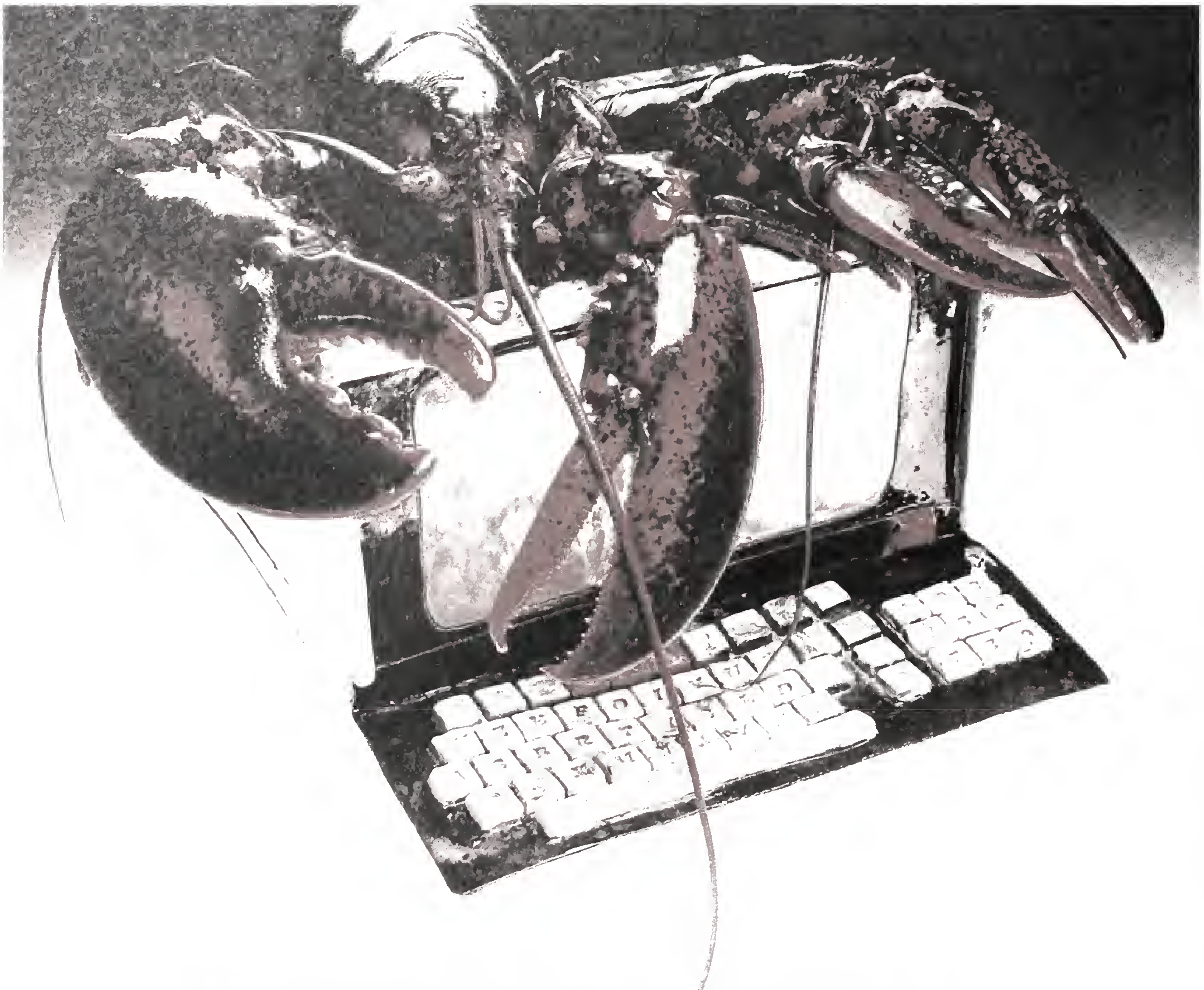
It is better to call these common terms a tentative glossary rather than referring to them as a standard — simply because persons become hesitant to accept anything that is labeled a standard, he advised.

In a typical medium-scale installation, a three-person staff would be required to do a performance measurement operation. This should include one manager that can communicate with corporate representatives and two technical persons, Stimler said.

One of the latter should understand how the firm conducts its business because this is important to a successful analysis of the DP methods employed, he added.

The group should make an estimate, which sometimes is little more than a guess of how much system improvement can be attained. After that the assumption should be tested to see whether it is realistic, he said.

Performance people are still suspect wherever they go and whatever they do, Stimler said, but DP costs are a significant part of company budgets, so performance improvement is still very worthwhile.



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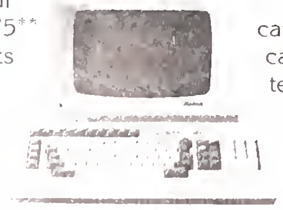

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Help Wanted

REXDALE, Ont. — The Canadian Standards Association (CSA) Committee on Programming Languages is trying to determine the need in Canada for standards on RPG-II and PL/1.

People with experience in these languages and managers of DP installations using them are invited to make their views known, a spokesman said.

Anyone willing to serve on a committee and take part in the standards work should contact H.Z. Rogers, Standards Administrator, CSA, 178 Rexdale Blvd., Rexdale, Ont M9W 1R3, Canada.

Service Offers Fortran Tests

(Continued from Page 35)

dard, Hoyt noted. The standards body is "petrified that users will participate in the comment period and delay the standard," he said, "but user participation is crucial."

Another area demanding attention is the creation of standard language interfaces to data bases, Hoyt stated. Again, the impetus behind this move is cost.

Users sending their Fortran programs and compilers to Hoyt for testing should include all the documentation they have on the software and address it to Patrick M. Hoyt, Federal Cobol Compiler Testing Service, Department of the Navy, Washington, D.C. 20376.

COMMUNICATIONS

Data Briefs

Fiber-Optic Communications Subject of Free Booklet

W. BOYLSTON, Mass. — The raised floors in computer rooms and error-checking hardware and software may become things of the past through the use of fiber-optic cables, according to a booklet from Valtec Corp. here.

"An Introduction to Communication Fiberoptic Design" is a 20-page illustrated text prepared and authored by the manufacturer's staff engineers and scientists.

The publication provides a brief history on the subject of fiber optics, presents the advantages of the light medium and briefly discusses initial costs, hardware savings and typical applications.

The introductory brochure is available free of charge from Valtec's Fiber Optics Division in W. Boylston, Mass. 01583.

Tau-Tron Adds Generator

N. BILLERICA, Mass. — Tau-Tron, Inc. has added a UHF data generator to its TMI product line for testing communications networks.

The MG-15 is a quarter-size plug-in module providing a serial data output at clock rates up to 500M bits, according to the company.

Programming is accomplished by front-panel toggle switch operation; the word length can be selected to either 15 or 16 bits.

The MG-15 sells for $3,300, a spokesman noted from 11 Esquire Road, N. Billerica, Mass. 01862.

Norland Has Data Analyzer

FORT ATKINSON, Wis. — Norland Instruments has announced the availability of the 2001A 6500, a 100-mHz waveform and data analysis system.

The system is comprised of the Norland 2001A data analyzer and the Biomation, Inc. 6500. It can capture signals at acquisition rates up to 500 mHz with 6-bit resolution, Norland stated.

The system costs $33,995, a spokesman noted from Rte. 4, Norland Drive, Fort Atkinson, Wis. 53538.

UDS Registers DAA

HUNTSVILLE, Ala. — Universal Data Systems, Inc. (UDS) has introduced the 1001F Data Access Arrangement (DAA) that conforms with the Part 68 long-form registration process of the Federal Communications Commission (FCC).

The 1001F has an RS-232C interface, can withstand up to 100m amps of dc line current and features automatic overload protection, UDS said. It costs $145 from 4900 Bradford Drive, Huntsville, Ala. 35805.

Told to Circumvent Restrictions

Multinationals Given Grim View of Overseas Nets

By John P. Hebert
Of the CW Staff

DALLAS — Data communications managers in multinational corporations that plan to implement or expand overseas networks might have to circumvent the physical and political hornet's nest of restrictions awaiting their efforts, two representatives of U.S.-based multinational companies and a British consultant on multinational communications stated at a recent conference here.

The problems include political restrictions on the type of data sent across national lines, restrictions on any data being transmitted, incompatibility of communications hardware and software and economic hindrances — compared with the relative ease of implementing a network in the U.S., the three panelists agreed.

The two major problem categories users will encounter overseas are regulatory restrictions and tariffs imposed by the government-run communications carriers and their resulting high costs, according to David Hebditch, a consultant with Expertise International in England.

A voice-grade leased circuit between Frankfurt, Germany, and Brussels, Belgium — a distance of only 180 miles — costs $20,000 per year, Hebditch said. A 200-mile link between London and Amsterdam costs about $15,000, while a voice-grade circuit between Geneva, Switzerland, and Stockholm, Sweden costs $35,000 annually.

In the U.S., however, 180-mile leased voice-grade lines cost $1,000 each for the first two and $2,000 for the third, he noted.

The cost of overseas services is exorbitant because they cross national boundaries and because the European Postal Telephone and Telegraph (PTT) authorities are "money-hungry organizations" that are short of capital, Hebditch said. Illustrating this last point, he pointed out that leased voice-grade lines between London and South Africa cost $160,000 each year, for example.

The cost of the same type of link would cost users $100,000 annually if the communications were routed differently to bypass "a certain country in Europe," he said.

When implementing a communications network in Europe "be well advised by somebody [there] because it will save you an awful lot of money," Hebditch urged.

Long Lead Time

James Hale, manager of corporate DP planning for the Coca-Cola Co., also advised users to make use of services provided by the major international record carriers located in the U.S. The only problem with this approach, he added, is finding the person or people qualified to identify and discuss the major pitfalls.

It is much easier to transmit data from the U.S. to overseas locations than it is to transmit between two adjacent countries overseas, especially between developing nations, Hale said.

The Coca-Cola conglomerate was quoted a lead time of 18 months to install a leased line between Johannesburg, South Africa, and Kenya. In addition, the company was informed the carrier could not guarantee a constant transmission speed on the link once it was established and, if a failure occurred during the rainy season, the mean time to repair would probably be eight weeks, Hale explained.

Dedicated Mini

The company circumvented this situation by placing a dedicated minicomputer in Kenya rather than transmitting information from a terminal to the CPU in Johannesburg, he noted.

Another way to bypass such obstacles, Hale continued, is to use an International Telex service, but even that, too, poses restrictions for the user. It is possible to use the service through a Western Union International domestic switch to make the different transmission codes compatible, he added.

Packet switching will be the best answer with the most promise for the low- to medium-range international user's needs.

(Continued on Page 38)

List of IBM-Compatible Hasp Workstations Grows

•Comten 7780, 7781 Debut

ST. PAUL, Minn. — Comten, Inc. has introduced two IBM 360/20-compatible Hasp multileaving workstations designed to work with Comten 3650 and 3670 Communications Processing Sytems (CPS).

In its basic form, the Comten 7780 consists of a 600 card/min Comten Model 7305 reader and 600 line/min Model 7406 printer. The 7780 also offers its user the option of sharing a Model 4008 system console for operator communications, according to the company.

The 7781 batch terminal workstation, which includes the card reader and the line printer, also has its own dedicated Model 4008 operator console.

Either configuration can be expanded to include up to six additional card readers and six more line printers. Workstation control can be provided by adding a multileaving adapter module and a multileaving workstation emulator to existing network control software, Comten said.

Sharing the resources of the Comten CPS reportedly eliminates the need for separate remote batch terminal control hardware.

All of the Hasp software for the workstation resides in the CPS. Network control procedures for full-duplex communications are supported on the remote CPS, according to a spokesman.

The 7780 costs $29,000 or $1,110/mo and the 7781 is priced at $32,500 or $1,256/mo in its basic form. The CPS ranges from $50,000 to $125,000, depending on configuration.

The workstations are scheduled for delivery by mid-September, the spokesman noted from 1950 W. County Road B-2, St. Paul, Minn. 55113.

•Raytheon Enhances PTS-1200

NORWOOD, Mass. — Raytheon Data Systems Co. has introduced a software enhancement which allows its PTS-1200 distributed processing system to perform the functions of IBM 360/20 remote job entry workstations.

In addition, the company added a security badge reader to its PTS-100 series of programmable terminal systems.

PTS-1200 enhancement permits Raytheon users at remote sites to communicate with such IBM spooling programs as Hasp, ASP and JES while concurrently interacting with the host on a transaction basis under IBM 3270 protocol and performing a variety of local tasks, according to Raytheon.

The workstation capability allows PTS-1200 users to access the capabilities of a host mainframe regardless of the mainframe location. Through commands entered from a system console, users can control the I/O operations of multiple remote peripheral devices, the company claimed.

Punched card data or data keyed onto disk or tape from PTS-1200 CRTs can be transmitted to a host and entered into the host system queue, with processed data returned to [illegible] devices under control of a set of utilities written in Raytheon's Macrol programming language, according to the [illegible].

PTS-1200 terminals with the enhancement can handle both batch and interactive communications jobs. Terminals [illegible] same system can handle both of those jobs at the same time, while other terminals are used to enter data [illegible] into local files or initiate local processing jobs, a Raytheon spokesman noted.

The Raytheon systems support Binary Synchronous Communica-

(Continued on Page 38)

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Data Trap Features Micro, CRT Monitor

PROVIDENCE, R.I. — International Data Sciences, Inc. (IDS) has introduced the Hawk 4000, a microprocessor-controlled data trap with a CRT monitor to help diagnose data communications problems.

The company also brought out two additions to its Series 8500 Minitech product line; the 8508 audio generator and monitor and the 8554 selector switch and monitor module.

The IDS Hawk 4000 Datatrap can interactively transmit and receive data between a modem and a terminal and display the data on a 9-in., 512-char. screen, according to the firm.

A total of 2,000 characters can be trapped and stored for later recall and study, IDS added.

The Hawk operator issues commands using a 16-key alphanumeric keyboard. All switches are stored in memory, the firm stated.

The monitoring system can operate with Binary Synchronous, Synchronous Data Link Control, Higher-Level Data Link Control and all Advanced Data Communications Control Procedures protocols, according to the company.

It handles full-duplex, asynchronous transmission rates from 75 bit/sec to 19.2 kbit/sec and synchronous speeds to 75 kbit/sec. Transmit and receive data can be displayed interleaved by character, by row or on a split screen, IDS stated.

Ascii, Ebcdic and hexadecimal formats are standard in the Hawk, which IDS said costs $9,975.

The Model 8508 audio generator and monitor reportedly allows its operator to listen to and acurately measure received analog signals appearing at the modem/-telephone line interface.

The unit generates a 1 kHz tone, variable from 0- to -16 dBm, which can be patched into a telephone line to determine line losses, IDS stated.

The IDS Model 8554 is a four-position selector switch and monitor module which reportedly allows the user to select any one of four 25-wire RS-232 interfaces.

The 8508 audio generator is priced at $810, or $730 for a rack-mounted version; the 8554 switch costs $255, IDS said from 100 Nashua St., Providence, R.I. 02904.

Develcon Modem Transmits 20 Miles

SASKATOON, Sask. — Develcon Electronics Ltd. has introduced the DS513, an asynchronous limited-distance data set.

The DS513 was designed for operation over metallic twisted-pair cable at speeds up to 9,600 bit/sec and distances up to 20 miles.

Transmission speeds up to and including 4,800 bit/sec can be achieved over loaded cable, according to the firm.

Typical operating distances on 26-guage cable is six miles at 9,600 bit/-sec, 10 miles at 4,800 bit/sec, 17 miles at 2,400 bit/sec and 20 miles at either 1,200- or 300 bit/sec, Develcon said.

Develcon's limited-distance data set costs $275 from the firm at 108 103rd St. East, Saskatoon, Sask. S7N 1Y7, Canada.

Multinationals Told About Overseas Nets

(Continued from Page 37)

because of the incorporation of standard protocols, Hale said. Packet switching will be first used in England, then France and Germany, he predicted, adding it would be a long time before it shows up in the developing nations.

Those contemplating the implementation of communications networks overseas are concentrating too much on the technical aspects of data communications rather than on the other aspects of multinational transmission, according to Janusz L. Madej, manager of international systems for Clark Equipment Co.

Implementation Aspects

The important implementation aspects of such multinational systems, Madej said, are the different vendors, rates, equipment, languages and subsidiary companies.

But the legal aspects of implementation are possibly the most important, he noted. "Be very careful about the information which you are sending abroad, or it could be subject to government investigation," Madej warned. Data scrambling may be necessary to bypass the PTTs, he said.

In addition, multinational networks should be part of the corporate management function. The network's function is to help manage and control the company, to help provide competitive services and to realize economies of scale, Madej said.

The networks also tie the corporate system with each overseas system to achieve consolidation for order placement, acknowledgement of received information and updating of local data bases, he noted.

Users should ask themselves "What is the function of the network?" rather than "What is the data which will be transmitted?" before they decide to install a network overseas, the speakers agreed.

PTS-1200 Enhanced As Hasp Workstation

(Continued from Page 37)

tions with mainframe spooling programs over leased lines or manually switched, half-duplex dial-up networks at speeds up to 9,600 bit/sec, he added.

The PTS-1200 hendles data compression and supports multileaving, which permits several files to be simultaneously transmitted and received. With the enhancement, the processor supports four input and seven output streams in addition to the system console stream, Raytheon said.

The software needed to support the 360/20 workstation enchancement is available without charge, the company added.

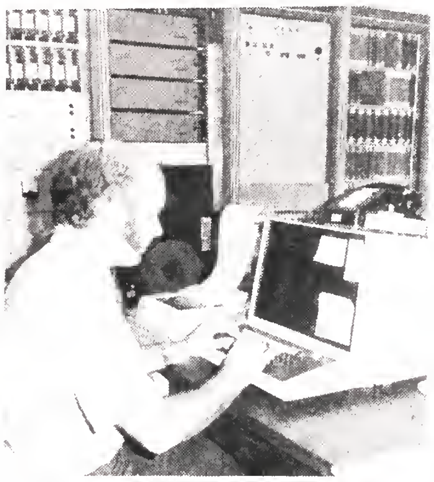
Badge Reader Bows

The Model 6140-01 security badge reader allows PTS-100 system users to restrict access to individual keyboard display terminals and/or applications programs and to restrict access from PTS-100 terminals to a host computer, the spokesman stated.

The device decodes up to 14 digits of numeric information contained on perforated cards the size of standard credit cards.

The security badge reader sells for $750 or rents for $26/mo. Raytheon is located at 1415 Boston-Providence Tnpk., Norwood, Mass. 02062.

MCI's Telemanagement Optimizes Phone Call Routing



CW Photo by R. Frank

Tom Richter, MCI's Dallas operations manager, enters data into Danray computerized switch using CRT.

By Ronald A. Frank
Of the CW Staff

DALLAS — A computerized switch is helping MCI Telecommunications, Inc. offer a service that optimizes phone call routing for business users to minimize their monthly phone bills.

Called Telemanagement, the MCI service provides users with optimum routing for calls and provides users with optimum routing for calls and provides complete monthly billing statistics for charge-back and other cost-accounting procedures.

The MCI service is available in six cities now, but plans call for expanding it to 37 cities by September, according to Gerry Taylor, vice-president in charge of the southwest region.

Telemanagement was designed to be used by any customer who has a phone bill of $5,000/mo or more, Taylor said. When a customer utilizes the service, his in-house switchboard is connected to the Telemanagement equipment at the MCI terminal location.

In Dallas, the company uses dual Danray, Inc. CTSS 1000 switches. Each contain dual Keronix, Inc. minicomputers which monitor call information and provide statistics on traffic to the user.

The Keronix CPU (only one is used with the other as backup) enters the traffic information onto a disk subsystem which contains 10M bytes of storage, according to Tom Richter, Dallas operations manager.

The Danray switch also includes a tape drive. Some customers are given monthly phone traffic information on tape (instead of a printout) which is then ready for processing on their in-house mainframes, Taylor said.

Handles Voice, Data Calls

Telemanagement can handle both voice and data calls depending on user-specified priorities. In some cases, if a customer [illegible]

Customer [illegible] connected to the MCI [illegible] local [illegible] the Telemanagement [illegible] are checked [illegible] each morning, Richter explained.

Also included [illegible] equipment is a Cognitronics Corp. [illegible] response system. When a calling user is held in a queue because all [illegible] to his line are in use, the processor will activate an audio message explaining the [illegible].

Customer priorities can be modified as necessary and a CRT or teletypewriter is available to MCI operations personnel to update instructions to the system.

The Telemanagement service currently handles calls for about [illegible] customers and there is a waiting [illegible] who want to be connected [illegible], Taylor said.

Typical Charges

A typical call placed on the MCI service [illegible] 22 [illegible] per minute depending on the type of line facility used. By [illegible] the [illegible] 4[illegible] cents per [illegible] Taylor noted.

[illegible] foreign exchange [illegible]

[illegible] the Telemanagement [illegible] range from [illegible] phone bills [illegible] and types [illegible]

[illegible] of the MCI [illegible] larger customers [illegible] through [illegible] Common Control Switching Arrangement (CCSA) [illegible] Telemanagement makes it possible [illegible] type of service to smaller users [illegible] justify the CCSA [illegible]

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Micral CRT From R2E Has 24K-Byte CPU

ORSAY, France — R2E [illegible] French [illegible] has introduced [illegible] CRT terminal system [illegible] word processing [illegible]

The Micral [illegible] 24K-byte processor [illegible] RAM [illegible]

[illegible] the Micral [illegible] storage [illegible] the [illegible] Corp. [illegible]

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Micro-Based Graphics Unit

Raster Scan CRT Designed for Novices

PALO ALTO, Calif. — Hewlett-Packard Co. has brought out the HP 2648A, a microprocessor-controlled graphics CRT terminal that utilizes raster scan technology and was designed for users with little or no programming experience.

Although the 2648A was developed for graphics applications, the terminal has the

HP 2648A

data entry and communications capabilities of the HP 2645A CRT, HP noted.

The raster scan display refresh technology reportedly gives the terminal an easily read display and enables users to erase and modify the display selectively without redrawing the displayed image.

This minimizes the user's waiting time and CPU overhead while reducing communications costs, according to HP.

In addition, both graphics and alphanumeric data can be viewed separately or simultaneously because they are stored in separate memories, HP said.

The basic terminal has 8K bytes of

Terminal Transactions

semiconductor memory, expandable to 12K, allotted to alphanumerics. Sixteen 16K random-access memories (RAM) provide a 360 by 720 dot resolution for the display of graphics, the company stated.

The CRT displays data in a 24-line format at a density of 80 char./line and in 9 by 15-dot character cells, it added.

Features of the graphics terminal include the ability to zoom and pan the displayed graphics image with one keystroke without the support of a host CPU; a line-drawing capability between any selected point and the cursor; and area shading and pattern generation, according to the firm.

The terminal also can help guide its operator in plotting tabular data and offers automatic plotting independent of the host.

The terminal can be equipped with optional built-in cartridge tape drives to provide 220K bytes of local data storage for on- and off-line applications, HP noted.

The price for a basic HP 2648A is $5,500; when equipped with the cartridge tape drives, the graphics terminal costs $7,100. Deliveries are scheduled for August, an HP spokesman said from 1501 Page Mill Road, Palo Alto, Calif. 94304.

Decprinter Gets Serial Interface

MARLBORO, Mass. — Digital Equipment Corp. has introduced a single printed circuit module serial interface for the LA180 Decprinter I.

The interface is available in two versions, for use with either EIA or 20mA current-loop connection. It enables operation of the LA180 with serial output devices and through modem-equipped telephone lines.

EIA operation provides automatic answering capability for unattended operation with Bell 202-type modems or equivalents, DEC said. Both versions convert serial Ascii data to parallel input compatible with the standard LA180 and both are switch-selectable for data rates from 300- to 9,600 bit/sec.

The interface costs $525 from DEC at One Iron Way, Marlboro, Mass. 01752.

SDX Offers Add-Ons For Tektronix 4051

ORANGE COVE, Calif. — SDX, Inc. has introduced two types of add-on memory for the Tektronix, Inc. 4051 graphics display terminal.

SDX's S32K plug-compatible memory system expands the 4051 system memory from 8K to 32K words of main storage through the addition of a circuit board which fits inside the 4051 cabinet, according to the firm.

Tektronix graphics terminals with main memories of 16K or more can be upgraded in 8K increments with the SDX S8K memory expansion kit, SDX noted.

Each memory comes with diagnostic software for system and memory test functions.

The S32K costs $2,395 and the S8K kit costs $495; installation is provided free of charge, according to the company, which can be reached through P.O. Box 41, Orange Cove, Calif. 93646.

AJ Redesigns Model 860 To Meet APL Users' Needs

SAN JOSE, Calif. — Anderson Jacobson, Inc. (AJ) has come out with a version of its AJ 860 desktop teleprinter terminal designed to meet the special character set requirements of APL language users.

The AJ 860-A uses a 9-wire dot matrix print mechanism to produce each character in a 9 by 12 cell.

The AJ 860-A costs $3,285 and will be available in the fourth quarter from the firm at 521 Charcot Ave., San Jose, Calif. 95131.

Perkin-Elmer Has Upkeep Plan

RANDOLPH, N.J. — Perkin-Elmer Data Systems has introduced a maintenance plan for users of its equipment.

"No Hassle Service" provides toll-free telephone contact between the user and the company's Central Dispatch.

The service allows certain diagnostics to be run while the customer is on the phone. Perkin-Elmer is at Route 10 and Emery Ave., Randolph, N.J. 07801.

Firm Speeds Job-Costing Chore

Badge Reader Devices Put Timely End to Time Cards

PARAMOUNT, Calif. — The installation of an on-line job-costing system at a manufacturing firm here reportedly has allowed the company to collect and process twice the time-and-material and payroll data in one-eighth the time as the previous manual system.

Lockhart Industries' system is comprised of badge reader terminals from Panasonic Corp. that are tied to a remote Hewlett-Packard Co. HP 3000-II Model 5 minicomputer in Long Beach, Calif.

Lockhart, which employs about 70 people, builds compact heat exchangers for use in airborne and shipboard navigation and guidance computer systems as well as oil coolers for motorcycles and automobiles.

The system collects the time-and-material data for invoicing, accounts payable and receivable and payroll. It was designed by Professional Computer Services, which houses the HP minicomputer.

Data is transmitted to the computer system over leased lines at 300- and 1,200 bit/sec through Vadic Corp. modems.

Terminal Transactions

When reporting for work, employees sign in by inserting a plastic badge with their employee number prepunched. This information is sent to the computer over the 300 bit/sec leased lines through Vadic 306G and 307G modems.

When ending a specific job, the production worker again inserts his badge into the Panasonic reader. He also keys in the job number, the subjob if any and the operation he has performed.

The computer verifies that he's a valid employee and that the job and the operation are valid. It measures the time interval and records the amount of time against the job.

Reports show the accumulation of time by workers on each job; this data is also used for the preparation of the payroll.

The system eliminates the need for time cards and manual posting of job-costing and payroll data.

Jobs are set up on the computer, costs other than labor and backlog are entered and output reports are printed using a General Electric Co. Terminet 1200.

The Terminet is located in the Lockhart plant and communicates with the computer system over a 1,200 bit/sec telephone line with Vadic VA1230K modems at each end. Two CRT terminals are similarly linked with the HP 3000.

Now an Hour's Work

According to Bill Pierce, Lockhart vice-president and treasurer, it now takes one person about one hour to do the reports. Before the system was installed — when Lockhart was doing half its present volume — the same reports done manually took one person a full day.

"The system costs about $1,000 a month. Without it, we would need two full-time people to do the same job," Pierce said.

"Also, we're getting much more management information. And the system is so simple that we can train someone to operate it in a couple of hours, which provides a continuity not possible with a manual system," he added.

Bob Goodman, owner of Professional Computer Services, said HP recommended the Vadic modems. "The modems have been very reliable and we're impressed with the diagnostics. For example, using local loopback, we can check out the modems at our computer site.

"Then by switching to remote loopback, we can test the phone lines and the modems located at the Lockhart plant," Goodman said.

Daily and Weekly Reports

A daily report is printed showing all labor entries by employee for a permanent time record. Exceptions are flagged and the report is reviewed for errors. Corrections and additions are entered each day.

A daily absentee report is printed, as are weekly labor reports by job and by employee to provide an audit trail of all labor entries into the job cost.

A weekly gross wages report by employee is furnished for payroll purposes.

Labor costs are accumulated by operation. Raw material, purchased parts and outside processing are accumulated by purchase order. A complete record of all job costs is maintained.

A summary of costs by job is available showing the direct labor, raw material, purchased parts, outside processing, last entry date and total costs.

Labor costs can be extracted by operation and subjob. Labor costs per unit are also available. External costs can be listed by purchase order and vendor with raw material, purchased parts and outside processing segregated.

A backlog file is maintained by purchase order line item within each job. Invoices are prepared interactively using the backlog file as a source of data. Payments can be coded to apply to the oldest invoices to preclude the necessity for listing individual invoices or to specific invoices.

A data base management system is also used to allow immediate and easy access to files for inquiry into job cost, employee data and accounting data.

Program changes are simplified by the independence of the programs from the data structure.

Techtran Adds Portable 815

ROCHESTER, N.Y. — The Model 815 Datacassette from Techtran Industries, Inc. is now available in a rechargeable battery-powered version, for data storage and retrieval applications.

The 815 weighs 10 pounds and the batteries are self-contained supplying a minimum of eight hours of continuous operation between charges, according to the firm.

The battery-powered 815 is priced at $1,095 including batteries and charger, Techtran said from 200 Commerce Drive, Rochester, N.Y. 14623.

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High Operator Data Entry Accuracy	Protected fields	Yes	Yes	Yes	Yes	Yes
	Low-intensity fields	Yes	Yes	Partial	Partial	Partial
	Numeric only fields	Yes	Yes	No	No	No
	Inverse video fields	Yes	Yes	No	No	No
	Blink fields	Yes	Yes	No	Yes	Yes
	Line drawing capability	Yes	No	No	No	Yes
Simple, Fast Editing of Data	Insert/delete character	Yes	Yes	Partial[1]	Yes	Yes
	Insert/delete line	Yes	Yes	Partial[1]	Yes	Yes
Minimized Loading on Host Computer	Host programmable send keys: send all data, send only unprotected data, send only data modified by operator, send only a "request to send" header.	Yes	No	No	No	No
Simplified Programming	Ability of host CPU to read device status	Yes	No	No	No	No
	Ability of host CPU to read device mode key settings and communication option straps	Yes	No	No	No	No
	Program override on mode key settings	Yes	No	No	Yes	No
Simplified Program Debugging	Transparent mode permits all characters to be displayed	Yes	No	No	No	No
Cost Effectiveness	OEM price in quantities of 25*	$1496	$1670	~~$1795~~ * $1595	~~$2395~~ * $2095	$1995

*When unit includes editing capabilities, 24 x 80 display, numeric pad, and upper/lower case characters. [1]No key. Requires Two Key Code.

* Just announced price changes

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Also Makes Price Changes

Burroughs Adds Four Units to Medium, Large Systems

DETROIT — Burroughs Corp. has expanded both its medium and medium-to-large-scale systems with the addition of four models. The firm also announced pricing changes on several other models.

In expanding its B6800 series, Burroughs added two entry-level systems, the B6803 and the B6805, which provide 50% and 60% respectively of the throughput of the firm's B6811, according to a spokesman.

The basic B6803 includes a 5 mHz CPU, a 12-channel I/O processor, 786,000 bytes of 770 nsec error-correcting core memory expandable to 3 million bytes, a maintenance diagnostic processor and an operator console with dual displays. It sells for $299,000 or leases for $8,600/mo on a 12-month lease.

The basic B6805 offers features similar to the B6803 with the exception of memory, which is 325 nsec error-correcting planar memory. The B6805 sells for $360,000 and leases for $10,355/mo on a one-year lease.

Deliveries for both models are scheduled to begin in the third quarter.

The firm also added two top-of-the-line models to its B2800 series, the B2810 and B2815.

The B2810 and B2815 models are object code-compatible with the larger B3800 and B4800 systems as well as with earlier B2700, B3500, B3700 and B4700 systems, the spokesman claimed.

The two models feature an I/O subsystem that offers up to 24 channels, each having its own Data Link processor. The Data Link processor accepts I/O commands and executes them independently of the CPU, he said.

A basic B2810 features a 2mHz CPU, 125,000 bytes of 667 nsec error-correcting MOS memory that can be expanded to 500,000 bytes, an 8-channel I/O subsystem and either a printing or display console. The basic B2810 with 250,000 bytes of memory costs $152,860 or $3,505/mo on a five-year unlimited lease plan.

A basic B2815 is similar to the B2810; however, the CPU operates at 3mHz. A basic B2815 with 250,000 bytes of memory can be purchased for $197,660 or $4,515/mo on the five-year plan. Deliveries are scheduled for the fourth quarter, the spokesman said, adding lease rates for all B2800 and B6800 systems now include around-the-clock field service seven days a week.

Burroughs has also increased the performance of its B6807 up to 60% by incorporating improved memory access logic which enables the CPU to utilize main memory more effectively, he said.

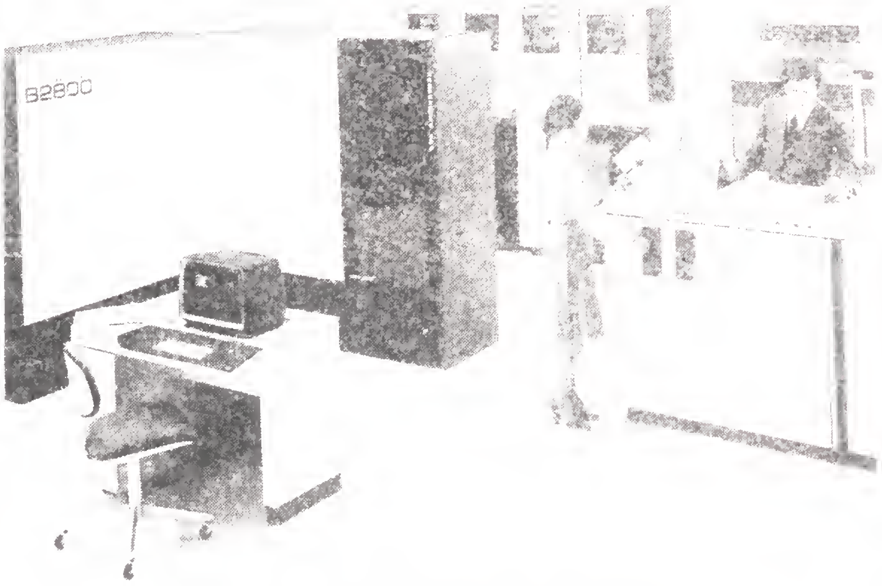
In addition, the B6806 and other B6800 series systems underwent pricing changes.

A basic B6807 with a 6.67 mHz central processor, a 20-channel I/O processor, maintenance diagnostic processor, dual-display operator console and 1.2 million bytes of planar memory can now be purchased for $589,000 or leased for $17,080/mo on a one-year lease, the spokesman said. This represents a 23% increase in purchase price and a 4% increase in lease price.

The B6811 with 1.2 million bytes of planar memory can now be purchased for $697,000 or $20,160/mo on a one-year lease. This represents a 5% reduction in purchase price and a 4% reduction in lease price.

The dual-processor B6821 with 2.2 million bytes of planar memory has been reduced 3% to $1,538,000, and the lease price has been trimmed 1% to $42,800/mo on a one-year lease. All lease prices include the 24-hour/7-day service availability.

In addition, price adjustments for the B2802 and B2803 systems were made. The basic systems with 250,000 bytes of memory now cost $151,315 and $198,095 respectively. Five-year lease rates are $3,515/mo and $4,445/mo.



Burroughs B2815 in a Financial Configuration

Zip Code Comparisons

Firm Uses 360 to Help Consumers Find Dealers

By Nancy French
Of the CW Staff

PEORIA, Ill. — A marketing services firm here is using an older medium-size mainframe and nine toll-free "800" telephone numbers to help consumers contact manufacturers or dealers who service their products.

At the heart of the Ruppman Marketing Services' 24-hours-a-day, seven-days-a-week marketing service is a leased IBM 360/40 and disk-resident data base.

An operator seated at a Courier Terminal Systems, Inc. CRT terminal here in Peoria can help a TV owner in Alaska find the most convenient place to service his TV with only a Zip Code to go on, according to Dave Ritterbusch, programmer/analyst at the firm.

The 360/40 is programmed to translate latitude and longitude into physical distances between Zip Codes. By comparing the home Zip Code of a prospect with the Zip-Coded list of dealers provided by its clients, the firm's mainframe can locate the names and addresses of the three closest dealers of the product about which the consumer is inquiring and can display it on the operator's CRT.

Conversely, the computer can also help each dealer locate its prospects and determine how to reach them through telephone advertising, direct mail and other marketing methods which, not coincidentally, can also be obtained from Ruppman.

Panasonic and British Leyland Motors are already on Ruppman's customer list, according to Ritterbusch.

Follow-Up Information

Some clients, such as the Air Force, want information captured about callers for follow-up. In that case, the operator asks the caller's name and address and keys them in along with answers to any other questions the client may want.

Ruppman can then send CPU-generated daily or weekly reports of callers' names and addresses to the client or even follow up with direct mail pieces, Ritterbusch said.

Ruppman's processor also keeps two IBM 1401 printers busy three shifts a day spewing out customized letters, some of them to customers of one loan company.

The letters, which are part of Ruppman's continuous customer contact service, "keep the customer feeling the loan company is interested in him as an individual," Ritterbusch explained, adding, "Most people who deal with a finance company feel they've been had."

These letters, which are sent out at predetermined times, try to capture what the individual is thinking about at that time and include such giveaways as budget planners.

The letters are tailored to each customer, based on the parameters of his relationship with the loan company, Ritterbusch added.

Ruppman also uses this system for a magazine collection program for several publishers' fulfillment houses, including those serving *Saturday Review* and *Ladies Home Journal*, Ritterbusch said.

When Panasonic TVs were recalled several years ago because of a manufacturing defect, Rudderman, with its data base of Panasonic TV warranty holders, played an important role. Panasonic publicized the recall program with an advertising campaign that utilized direct mail as well as use of the 800 number so TV owners could more easily find their nearest dealer for repairs, Ritterbusch said.

Interestingly enough, the firm does no housekeeping chores on the 360/40. When its accounting department was automated, a Burroughs B700 small business system with standard vendor-provided accounting packages was obtained, Ritterbusch said.

When the Model 40's lease is up next year, the firm will probably install a second 40 in a dual-processor configuration with the present system, with shared tape and disk subsystem, he said, rather than upgrading to a 370.

EMM Offers Memory Upgrade For IBM 360/65 and 370/148

HAWTHORNE, Calif. — Electronic Memories and Magnetics Corp. (EMM) has introduced add-on memory for users of IBM 370/148 and older 360/65 processors.

In its enhancement of 360/65 systems, EMM said it can now install up to 8M bytes of add-on memory per CPU. The memory offering also includes the models 65MP and 67, a spokesman added.

A deferred maintenance feature is available for all main storage which allows users to switch failing memory off-line in 1M-byte increments, he said, adding the CPU upgrade is included in the package.

The upgrade memory sells for approximately $100,000 per megabyte, the spokesman said.

IBM 370/148 users can now expand their CPUs to 4M bytes, effectively doubling the present maximum capacity allowed, according to the spokesman. The 148 memory is a functionally equivalent, pin-compatible semiconductor memory utilizing 4K static random-access memory devices, he added.

Also featured is the System Interface Module that provides the signal timing and data control functions. It also controls the Basic Storage Module that contains 18 memory boards, providing a maximum capacity of 1M byte. Each board contains 128 4K-bit elements.

Up to three Basic Storage Modules provide up to 3M bytes of storage and one System Interface Module are contained in one cabinet, according to the spokesman.

The system is priced at $75,000 per megabyte. Initial deliveries will begin late in the third quarter, the spokesman said from 3216 W. El Segundo Blvd., Hawthorne, Calif. 90250.

Datawest Introduces Array Processor, Univac Interface

SCOTTSDALE, Ariz. — Datawest Corp. has introduced both a channel interface for the Univac 1100 series processor and the Datawest Real-Time III microprogrammable array transform processor.

The interface uses the word channel as the I/O device and reportedly offers the Univac 1100 user relatively high-speed array processing, according to a spokesman.

The array processor is microprogrammable and contains its own data memory, which is expandable up to 1M byte. Word size is compatible with the 1100 series product line, he explained.

The interface costs $15,000 from the firm at 7333 E. Helm Drive, Scottsdale, Ariz. 85260.

Management Courses Listed in AMA Guide

NEW YORK — The American Management Association (AMA) is offering its "Management Development Guide" catalog of courses at no cost to *Computerworld* readers.

The 264-page guide lists the AMA's educational services to management.

The catalog is divided into two parts. The first covers the center for Management Development, seminars, courses, briefings, customized in-company training and career development.

The second part discusses publications, the Center for Planning and Implementation, Presidents Association, multimedia in-company training and other programs.

The catalog can be obtained from the AMA at the American Management Associations Building, 135 W. 50th St., New York, N.Y. 10020.

RTE Called One of Best System Evaluation Methods

By John P. Hebert
Of the CW Staff

DALLAS — End users of computer systems are being given more importance in the systems procurement process, but one of the best evaluation methods has not yet filtered down from government to private DP operations.

That method, remote terminal emulation (RTE), is a computer measurement and evaluation technique in which the teleprocessing workload imposed on a computer system is emulated by another computer, Marshall Abrams of the National Bureau of Standards (NBS) said at a recent conference here.

At NBS, computer systems are judged by their service potential to the end user — the person sitting at the system terminal — rather than by their potential utilization, according to Shirley Ward Watkins, a computer scientist at NBS' Institute for Computer Sciences and Technology.

RTE helps the government base its procurement decisions around terminal response time and system turnaround time, Watkins explained.

Alternatives to RTE include a program internal to the host CPU or a driver implemented external to the system.

The techniques of using a tape mechanism to mimic a human operator or actually including the operator in tests do not give an accurate picture of the system being tested on the one hand, or they allow too much data or too much subjective data to creep into the results, she indicated.

Best of Both Worlds

An RTE device emulates the terminal and the operator, allowing the best of both worlds, Watkins said.

RTEs have been around since the mid-1960s, implemented as both teleprocessing workload drivers and monitors, but now there is greater acceptance and recognition of their utility as a performance measurement tool, Watkins and the other panelists at the conference session agreed.

Working with the Mitre Corp., the U.S. Air Force has developed its own RTE, which has successfully tested a number of vendors' machines, including the Burroughs B6700, Digital Equipment Corp.'s PDP-11/70, Control Data Corp.'s Cyber series, and Hewlett-Packard Co., Honeywell Information Systems, IBM and Univac CPUs, according to Watkins.

And there are emulators which have been or are being devised by a number of vendors for their own systems.

But not all vendors' emulators with which NBS worked had the same definition of response time. A standard definition must be formulated before RTE testing begins in order to answer the questions of which system is most acceptable and whether future upgrades will be required, Watkins added.

Benchmark Objectives

Teleprocessing benchmark objectives for an RTE of the system under test are that it be representative of the service workload, be equitable to all potential vendors, that it test all system components and have a real-world resemblance, according to Jerry McFaul of the U.S. Geological Survey (USGS).

At USGS, the only existing method found able to achieve the USGS goals was RTE, and vendors had to have their own emulators to be considered in the procurement process, McFaul told attendees.

He described USGS' heavy workload as being carried by from 48 to 96 asynchronous terminals transmitting through 300 bit/sec lines. Another 12 to 28 synchronous remote job entry (RJE) terminals are in operation at any one time at transmission speeds from 1,200 to 9,600 bit/sec.

In addition, the USGS has batch terminals running four to seven jobs with functionally distinct programs, McFaul said.

All vendors' RTEs could display both the actual CPU-to-terminal dialogue and the emulation status, while capturing the RTE traffic on log tapes, he said.

Some vendors' RTEs could display the exact position within the selected RTE "manuscripts" and all of them could also display the emulation status for the synchronous terminals in the system under test.

But minor modifications had to be made to all of the RTEs, McFaul said, explaining that the typical problem was a compounding of software and hardware errors.

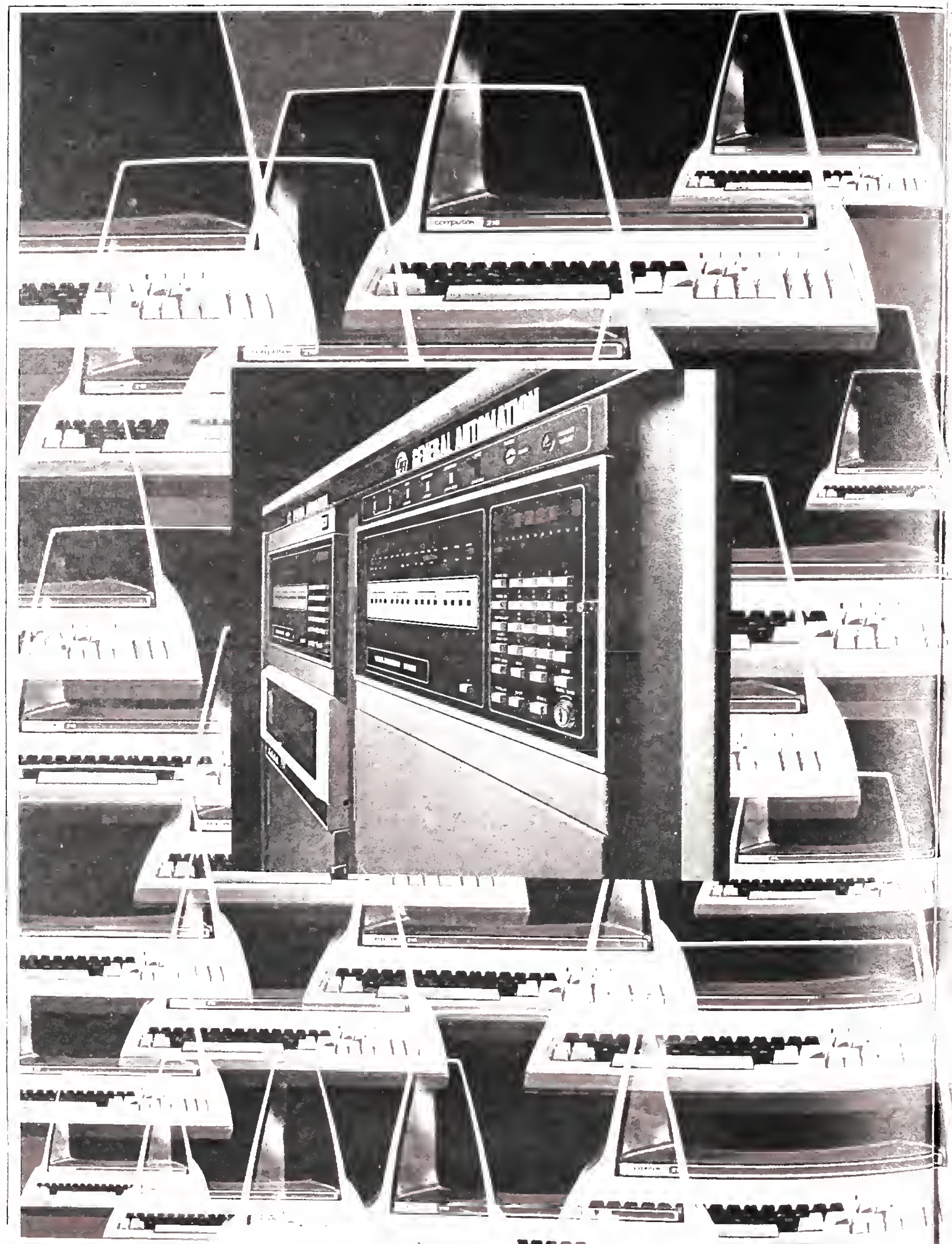
"Worthwhile Exercise"

"RTE is a worthwhile exercise. I'm confident the [Honeywell Multics] system we bought can handle a large terminal workload," he told session attendees.

And Couley Arthur, a Honeywell RTE engineer who worked with USGS was also on hand to describe RTE development and application criteria.

Honeywell's RTEs were developed by company engineers as a measurement tool and for simulation of intelligence using the terminal's protocol, Arthur said.

According to NBS' Abrams, vendors don't want the government to make a standard RTE benchmarker. It may be a long time before RTEs proceed from the ranks of government agencies to business users, he indicated.



Must Anticipate Bottlenecks

New Storage Techniques Seen Becoming Indispensable

By Frank Vaughan
Of the CW Staff

DALLAS — The performance aspect of systems is becoming so important that it may give rise to a situation where it becomes indispensable to adopt new technologies in the secondary storage environment, according to Peter Schneider of Siemens AG, speaker at a recent conference here.

Schneider discussed the demand he said he feels exists for new secondary storage technology.

"At the present state of technology, memory system costs remain the dominant factor in the overall cost of a computer system, with the costs of the secondary storage, in addition to those of main memory, representing an appreciable share of the total storage system costs," he said.

"Thus, if a new technology, such as charge-coupled device (CCD) or the bubble, is to be implemented in the storage system, it must ensure a more favorable price - performance ratio of the overall system. It must, for example, either reduce the costs for an unchanged system performance level or substantially enhance the system performance level for a constant or rising cost burden," he explained.

Simulations have revealed that the degree of multiprogramming and the number of devices are factors of similar weight with regard to the CPU utilization level, but the number of devices represents the more crucial bottleneck, he reported.

"If the secondary storage system is underrated in terms of the number of devices employed in the storage system rather than in terms of the storage capacity, not even a high degree of multiprogramming will be able to raise the CPU utilization to a satisfactory level," he said.

"In view of the ever-increasing recording density in disks and the enhanced CPU performance levels, the emergence of a bottleneck in the secondary storage environment must be anticipated. It would appear that the adoption of a secondary storage hierarchy, managed by a storage processor, represents a more cost-effective approach than the provision of the devices required for parallel operation," he noted.

Simulation Models

Schneider supported his contentions with a series of charts, graphs and mathematical formulas that examined the simulation models used, distribution of processing time function, degree of multiprogramming, CPU utilization and page transfer times.

"For a constant on-line data file volume, an increase in the number of devices — for example, a distribution of the files among such a number of devices as are necessary to attain required I/O handling time — would considerably boost the costs and yet fail to lead to a full utilization of the devices," he charged.

Even in systems with a large on-line data file volume, the cost situation will give such a storage hierarchy complemented by cassette storage a competitive edge on a system with a large number of disks.

The performance data of the CCD technology will in any case accommodate the page transfer times which may possibly be required in the system, he said.

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*Complete quotes and customer identification available from GA on request.

Quantor Ups Prices

MOUNTAIN VIEW, Calif. — Quantor Corp. has instituted an across-the-board price increase for all its computer output microfilm (COM) systems effective Aug. 1, according to a spokesman for the firm.

Prices will be increased an average of 5%, he said, noting this is the firm's first price hike in over two years.

The increase was brought about by continually expanding systems and supplies support, including field service, across the country.

Unit Shreds Printouts

GLENVIEW, Ill. — Cummins-Allison Corp. has a desktop paper shredder for computer printouts.

The Cummins 45 has a 17-in. wide throat to permit flat feeding of printouts. The unit has a 12- to 14-sheet feed capacity and will shred at a rate of 90 ft/min, a spokesman said.

The 88-lb shredder costs $1,399 from the firm at 800 Waukegan Road, Glenview, Ill. 60025.

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Software Research and Development

Bill Foster, Director
Software Development

Data General's business is growing extremely fast, and Software Development is growing even faster. Our greatest challenge today is to find enough quality people to meet our expanding needs at both our Westboro, Mass. Corporate Headquarters and our R&D facility in the Research Triangle Park near Raleigh, North Carolina. In both locations we have immediate openings for all levels of Software professionals: junior and senior individual contributors as well as experienced project and section managers with proven track records.

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Larry Seligman, Director
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Wilton Rooks,
General Manager
Systems Division

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Systems Analysts
Senior Programmers (Cobol)
Programmers

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Steve Gaal, National Manager
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If you happen to see this advertisement after the interview dates specified, you're not too late. You can apply for any one of these positions simply by sending your resume to the Personnel Department, Data General Corp., 15 Turnpike Rd., Westboro, MA 01581, Dept. CW-2.

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Mini Bits

Grosch to Present Keynote At Wang Users Conference

LOWELL, Mass. — Wang Laboratories, Inc.'s Society for Wang Applications and Programs (Swap) will meet Oct. 31 through Nov. 2 in Boston, according to a spokesman.

A variety of presentations, workshops and panel discussions will be presented. Dr. Herbert R.J. Grosch, president of the Association for Computing Machinery, will be the keynote speaker.

Special training courses will also be offered. Further information is available from Swap, Wang Laboratories, Inc., 1 Industrial Ave., Lowell, Mass. 01851.

Incosan Unveils PDP-8 Interface

SPARTA, N.J. — Incosan, Inc. has a single serial interface board it said is capable of driving three serial devices from one Omnibus slot in a Digital Equipment Corp. PDP-8/A or PDP-8/E system.

The unit is a standard quad-height board with three DEC-type serial interface connectors attached to it. Serial devices are plugged directly into the board.

The Incosan board is particularly suited to a DEC VT50 or VT52 Teletype-replacement CRT, but any standard 20mA Teletype replacement is compatible, Incosan said.

The board is software-compatible with the standard PDP-8 keyboard/printer instruction set and can be operated without software modification, the firm claimed. It costs $695 from Incosan at 160 Woodport Road, Sparta, N.J. 07871.

RDA Has Unit for Educators

BELTSVILLE, Md. — The PRD11 system from RDA, Inc. is a portable unit based on the Digital Equipment Corp. LSI-11 and designed for educational and data acquisition applications.

The PRD11, which includes the LSI-11 and 56K bytes of random-access memory (RAM), is packaged in a 23-lb suitcase configuration, a spokesman said.

The unit can handle up to four Basic langauge users. In data acquisition applications, it can accommodate up to 64 analog and digital channels, the spokesman noted.

The PRD11 with 32K bytes of memory and a serial line interface costs $4,950.

A typical system with 56K bytes of RAM, fixed and floating arithmetic, serial I/O, Linc tape mass memory, Texas Instruments, Inc. TI 745 portable printer terminal and DEC RT11 operating system costs $11,790 from RDA at 5012 Herzel Place, Beltsville, Md. 20705.

More Tasks Off-Loaded

Citibank Proofing Operation Gets Minis

By Esther Surden
Of the CW Staff

NEW YORK — In yet another application, Citibank here has replaced a system formerly running on a large IBM mainframe with five minicomputers.

Called Citiproof, the application is part of a larger integrated customer transaction, financial service reporting and corporate accounting system due to be implemented soon. The Citiproof application handles more than $12 billion in transactions daily using 160 proofing centers.

The system captures about 75,000 detailed transactions of corporate customers each day and provides summary records of more than two million corporate and personal checking transactions.

In accordance with Citibank's corporate philosophy of decentralization, "we almost out of necessity had to go the minicomputer route," according to Brian Trainor, vice-president in charge of implementing the Citiproof system.

Prior to the installation of the minis, the bank performed the application on an IBM 360/158. "Every department in the bank would submit a handwritten proof and those proofs would be keypunched one run into the 158, where they would be edited and the general ledger updated. We discontinued that in August of last year," Trainor said.

Digital Equipment Corp. PDP-11/70s were chosen as the minis to handle the application "really on the basis of our experience with DEC," which Trainor described as "quite extensive."

"At the time we had about 30 DEC systems in the bank and had written a lot of [illegible] software on the system," he explained. It also [illegible] the software [illegible] dors with which [illegible] and in which it had the most confidence were vendors with experience on DEC equipment, Trainor said.

Application software for the [illegible] was written by Cibar, [illegible] Colorado Springs, Colo., in conjunction with Citicorp Operating Group [illegible].

Cibar also [illegible] had been in the bank [illegible] the development of Citiproof [illegible] very small outfit [illegible] have to [illegible] and [illegible] Trainor [illegible]

Two of the bank's [illegible] three of the [illegible]

"We [illegible] the month of [illegible] the [illegible]

[illegible] PDP- [illegible] 32K [illegible] there [illegible]

[illegible] MIS [illegible]

[illegible] DEC [illegible]

[illegible] IAS/RSTS [illegible] trans- [illegible]

[illegible] IAS or RSX [illegible] written [illegible]

Interdata Configures Systems For Scientific Applications

OCEANPORT, N.J. — Interdata, Inc. has configured [illegible] specifically for scientific users.

The Laboratory System-16 (LS/16) includes a 16-bit Interdata 6/16 processor with 48K bytes of memory, dual floppy disk [illegible] CRT [illegible] and [illegible] The [illegible] OS/16 MT2 [illegible] operating system [illegible] Fortran IV, a [illegible]

[illegible] compati- [illegible] Motorola 6800 [illegible] The system can serve [illegible] to control [illegible] instruments or [illegible] can also communicate [illegible] processor.

[illegible] called the [illegible] includes a [illegible] 256K bytes of [illegible] floating-point hardware [illegible] M bytes of disk, CRT [illegible] OS/32MT multitasking [illegible] software and Fortran VI [illegible]

It is suited [illegible] to develop and execute Fortran [illegible] the company noted, [illegible] with large data arrays.

The system [illegible] pro- [illegible] pulations [illegible] and will [illegible] research, [illegible] engineering, it [illegible]

The [illegible] the [illegible] $77,000 [illegible] at 2 Crescent Place, Oceanport, N.J. 07757.

Datapro Sees Speed Top Factor For User Picking Mini Printer

DELRAN, N.J. — Speed of operation is the overriding criterion for minicomputer printer selection, according to a report called "All About Minicomputer Printers" from Datapro Research Corp.

"Because speed is the first consideration, it is unfortunate that printer speed can be difficult to evaluate. The reason is that a printer's effective speed frequently depends on factors to which it is difficult to assign values," according to the report, which evaluated 315 models of minicomputer printers from 96 vendors.

Effective speed "can depend on the distribution of characters in the text to be printed, the number of characters in the text to be printed, the number of characters in a line and the layout of the form being printed," the researchers said.

Although a complete discussion of the factors involved in evaluating the speed of printing devices was deemed beyond the scope of the Datapro report because of the complex mathematics involved, the firm did highlight some areas for the prospective user to consider.

User Consideration

"The usual approach to evaluating performance of mechanical devices is to determine the basic cycles or repetitive actions and go from there." However, this presents a problem in the printer area, according to the report.

The logical cycle may not agree with the basic machine cycle. For example, the time it takes to print a line and space to the next line may not match one revolution of the drum or one circulation of the print train.

(Continued on Page 48)

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Can't Be Resold

System 34 Licensed Software Policy Worries MIC

CHERRY HILL, N.J. — The IBM System 34, which is bound to be a serious contender for the user's dollar, pulls some surprise punches, according to a report by Management Information Corp. (MIC).

"What surprises us is the fact that IBM announced the System 34 . . . fully nine months before its January 1978 delivery date," the firm said in the June issue of *Small Business Computer News*.

"What worries us," the report continued, "is that with the System 34, IBM has joined with NCR and Burroughs in a new pricing policy whereby systems software cannot be purchased with the hardware, but is licensed to users and paid for on a monthly basis.

"In other words, the user who purchases a System 34 will not be able to sell the system with operating software; whoever buys it will have to go back to IBM for such software."

The System 34 is more powerful and versatile than the 32, but it is also more expensive if entry-level configurations are compared, the article noted.

A System 34 configuration with 32K bytes of memory, 8.6M bytes of disk, a diskette and a 40 char/sec printer costs $1,200/mo compared with $1,000/mo for a comparably configured System 32.

"With the System 3, the comparison is more delicate since the various models of the System 3 have different capability mixes. Generally speaking, the System 34 is not as powerful as some models of the System 3, but it is faster and more versatile," MIC said.

The following are some comparisons with the IBM 3 made in the article:

- Memory cycle time: The System 34 is twice as fast as the System 3.
- Storage capacity: 65K bytes for System 34 vs. 263K bytes for System 3.
- Operating system: The System 34 is true multiprogramming with up to eight concurrent programs; System 3 is a dual-partitioned multitasking system, not multiprogramming.
- Number of terminals: Up to eight for System 34; up to 30 for System 3.
- Disk system: System 34 uses a fixed disk with 27.1M bytes maximum capacity and 45 msec average access time, which is larger and faster than System 3 models 4, 6 and 8, but not as good as the larger models.
- Application software: The System 34 can use System 32 application software; the System 3 cannot.

A copy of the report can be obtained for $7.50 from the publisher. *Small Business Computer News* is available monthly on a subscription basis for $51 per year from 140 Barclay Center, Cherry Hill, N.J. 08034.

Unico System Based on 8K Mini

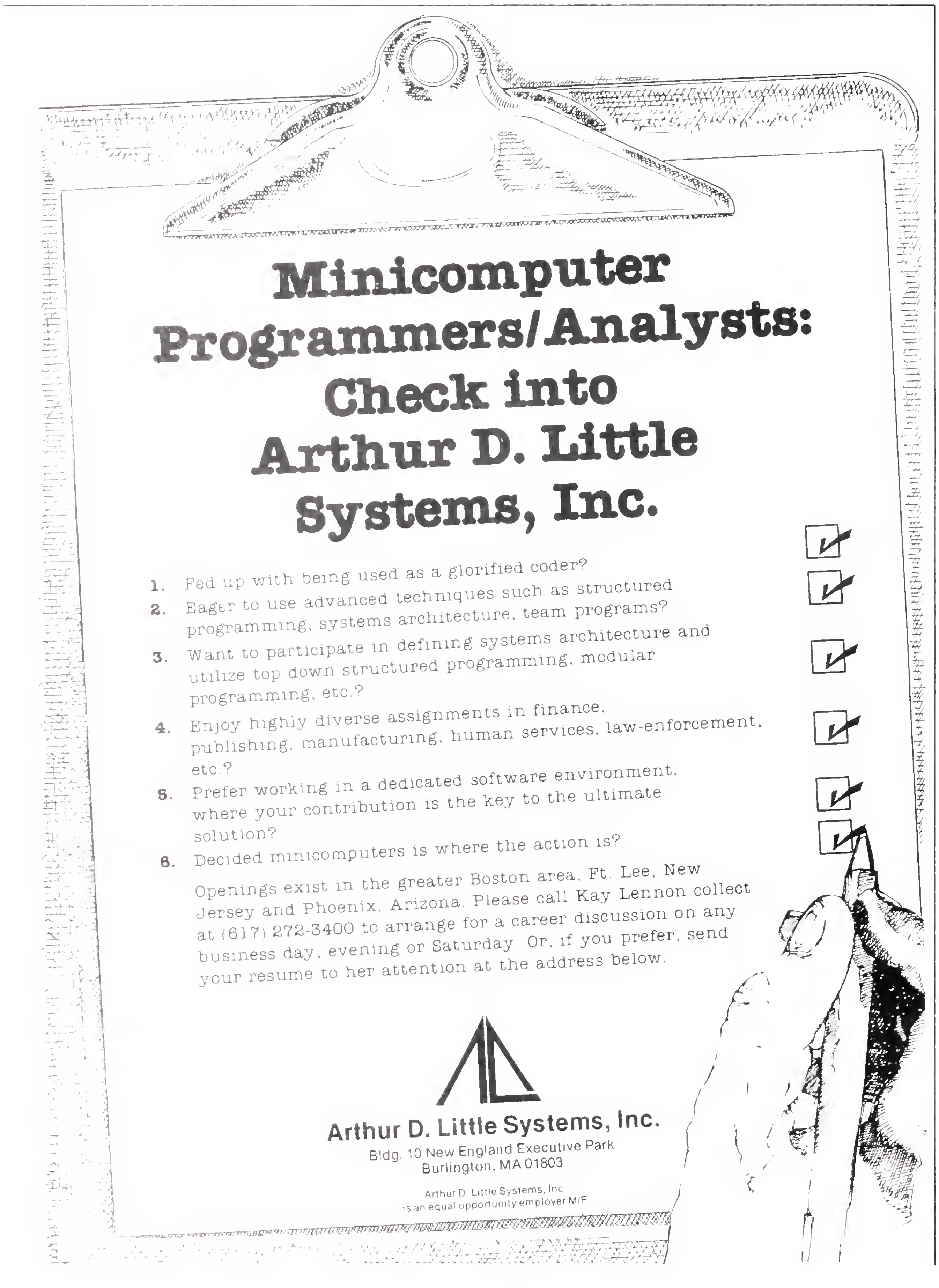
FRANSVILLE, Wis. — The Unico, Inc. System IV Direct Numeric Control unit is based on a single-board 8K minicomputer.

Designed for use in materials handling, food and drug processing and measuring and gauging applications, the System IV uses Unico Real-Time System software. It is said to offer the size and convenience of a programmable controller with the flexibility of a general-purpose system.

Three modes of operation are available. The test mode is used for diagnosing hardware and software problems; the load mode to enter diagnostic programs, application programs and system data; and the run mode for normal system operation, Unico said.

Memory on the system can be expanded to 32K words of data and instruction storage, the company noted. The system recognizes the instructions of the Digital Equipment Corp. PDP-8 mini, a spokesman added.

The System IV costs $17,258 for an 8K CPU, keyboard, display, paper tape reader, data I/O station, power supply and data interface module. Unico is located at 3725 Nicholson Road, Fransville, Wis. 53126.



Mini Printer Speed First Consideration

(Continued from Page 47)

the report explained.

For a character-at-a-time printer, the time required to print a character depends on the arrangement of the printing mechanism and may be constant for all characters or vary depending on the location of the character to be printed on the printing element, the report continued.

Character printers usually run at the speed of the slowest character to achieve a uniform printing rate. "Thus, the average printing rate is the time required to return the carriage and the time required to space a line."

Keeping this in mind, the average speed in char/sec for a highly formatted form could be lower than the quoted peak speed or, because substantial time savings can be realized for short lines, the speed quoted in line/min "could be quite respectable," the researchers noted.

"As a rule of thumb, frequent short lines make a character printer look good and frequent line-spacing operations tend to make it look bad," they added.

The design and execution are more complex for a line printer than for a character printer, Datapro noted.

They are dependent on coordination between the printing, usually done while the paper is moving, and the logical operations, which compare the contents of a buffer in the printer to the character coming into position for each print column, it explained.

The number of different symbols printed in a line and the size of skips between lines are the basic factors affecting line printer speed, Datapro reported.

The report identifies all the various types of printers and printing techniques and explains advantages and disadvantages of each. In addition, specifications are published on various vendor's minicomputer printers.

The 73-page report costs $12 from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

COMPUTER INDUSTRY

CI Notes

SBS Puts Out Bid Request For TDMA Burst Modems

McLEAN, Va. — Satellite Business Systems (SBS) has issued requests for proposals for the design and manufacture of high-speed time-division multiple-access (TDMA) burst modems for its communications satellite earth stations.

SBS asked for fixed-price proposals for delivery within 12 months of five prototype modems — four equipped for operation at 48M bit/sec and one equipped for operation at 43M bit/sec.

SBS said it contemplates the award of contracts to two manufacturers whose modems will be subjected to competitive evaluation by SBS. Each manufacturer would keep two modems for life testing at its facilities and deliver three to SBS for field trials.

Responses are due within 60 days to SBS at 8003 Westpark Drive, McLean, Va. 22101.

Documation Cuts Personnel

PALM BAY, Fla. — Documation, Inc. has laid off a portion of its production, engineering and administrative personnel at its main manufacturing facility here.

In conjunction with the reduction in its work force, remaining employees here are being asked to schedule their vacations so they fall in the company's second quarter ending Aug. 12.

A spokesman for the company said the personnel reduction is intended to bring inventories in line with sales projections for the second quarter.

Raytheon Plans Terminals

BURLINGTON, Mass.— Watch for Raytheon Data Systems' new line of terminals which it said will be competitive with the IBM 3274 and 3276 in both features and price. The line should be revealed in mid-August.

Supershorts

Rockwell International and Sharp Electronics of Tokyo have signed a licensing agreement under which Sharp will manufacture and market Rockwell's line of PPS-4 and PPS-8 microprocessors.

— — —

BOC Datasolve, Ltd. has acquired the exclusive marketing rights in the UK to the computer application systems of McDonnell Douglas Automation Co.

'No Technology Transfer'

CDC Defends Wisdom of Cyber Export

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. — The government's refusal to permit export of a Control Data Corp. Cyber 76 to Russia involves no transfer of technology, does not represent a threat to national security and could result in social and economic damage, according to testimony presented before the International Economic Policy and Trade Subcommittee.

The Commerce Department blocked the [illegible] could be put [illegible] the denial "political" [CW, July 4].

"The refusal of the United States government [illegible] executive agencies with responsibilities in this matter to allow [illegible] the misunderstandings of the case [illegible] seen [illegible] their statutory responsibilities," Robert [illegible] Schmidt told the House Committee [illegible] International Relations.

[illegible]

CCIA Warns of Grave Dangers From De Facto EFT Standards

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. — The Computer & Communications Industry Association (CCIA) said it supports several recommendations put forth in the National Commission on Electronic Fund Transfers (EFT) working papers, but urged that body to reconsider its position on industry standards.

In recent testimony before the commission, the CCIA endorsed deregulation of EFT equipment, limiting regulation to the transparent communications network and maximum separations approach for EFT services.

It warned, however, of grave dangers in the working paper's de facto standards proposal.

"While we agree with the commission that 'federally' mandated standards, in the sense of technical standards developed and enforced by a federal standards body, for EFT terminals and systems may not be appropriate at this time, still, in looking at the nature of the evolving EFT marketplace, we believe firmly that industrywide standards are a necessity," the testimony stated.

The CCIA supported comments offered last March by the American National Standards Institute Standards Committee, which noted "the success of EFT is dependent upon development of standards . . . which will make possible nationwide or international interchange. Well-developed standards will promote the participation of large and small suppliers in providing equipment to the users."

While agreeing with the EFT commission's conclusion that mandating standards would be contrary to the princi- [illegible]

[illegible]

Printer Industry Gearing Up For Likely Market Shakeout

By Molly Upton
Of the CW Staff

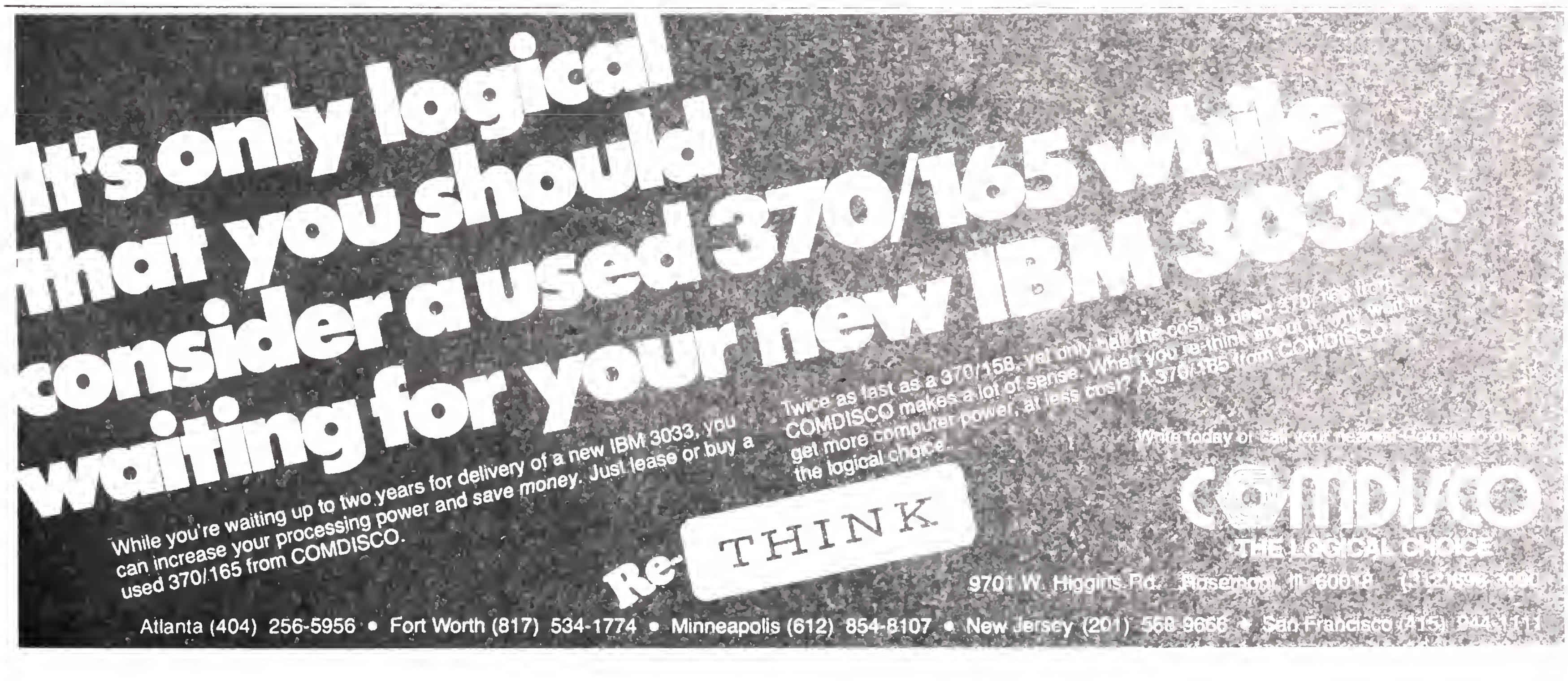
DALLAS — As [illegible] manufacturers [illegible] to expand their lines with both higher and lower speed printers, many exhibitors at a recent conference here agreed there could be a shakeout in the industry before too long — if it has not already begun.

Others are scurrying to establish themselves in particular niches in the marketplace.

The printer makers seemed to have the lion's share of new products on the exhibit floor, with many of the products representing new ventures in either speed or technology for particular firms.

"The shakeout is already happening," according to Chandler Williams, manager of business systems for Lally Corp. "There are a lot of little guys not doing much," he explained.

[illegible]



Five-Year-Old Firm

Prime Chalks Up Its First Positive Retained Earnings

By Molly Upton
Of the CW Staff

BOSTON — After five and a quarter years of operation, Prime Computer, Inc. has achieved positive retained earnings, President Kenneth G. Fisher told stockholders here recently.

With the first quarter of 1977, the mini maker had $500,000 in retained earnings, thus changing the firm's [illegible] "highly leveraged" [illegible] "solid almost conservative [illegible] pany," he [illegible].

Earnings [illegible] $732,000 [illegible] credit [illegible] [illegible] the same period [illegible] sales grew 135 [illegible] million compared [illegible] year-ago quarter.

The [illegible] quarter of 1975 [illegible] sumed [illegible] Prime showed negative [illegible] million, he said.

The cash position on the balance sheet has also improved from $75,000 in the second quarter of 1975 to $1.3 million in the first quarter of 1977, he added.

The firm is in the process of finalizing a $20-million line of credit with several major banks. Currently it has a $10 million line with the First Pennsylvania Bank, he said.

Although Fisher said he won't preclude another equity offering, it will not be in the immediate future. "It will be some months," he predicted.

Solid Megamini Market

Prime's products fall in the higher end of the mini spectrum, and the market for megaminis is very firm and very solid, Fisher observed.

The firm's [illegible] is to offer large-scale [illegible] prices, and [illegible] is doing this, Fisher said. Thus, the market is [illegible].

However [illegible] which the [illegible] intends to [illegible] he added.

Prime [illegible] from [illegible] the Model 300 [illegible].

[illegible] Fisher said.

[illegible] Model 400 [illegible] the [illegible].

[illegible] DP [illegible] the [illegible].

[illegible]

During [illegible] accounted for [illegible] 82 [illegible] of all end-user systems sold for the year, Fisher noted in the report.

Prepared to Lead

Prime, which provides systems software rather than applications software, sees the increasing importance of software as a plus, since it is "quite prepared" to be a leader in the systems software area, Fisher said in response to a shareholder's question.

Present production capacity, which recently doubled, should be adequate through sales of $100 million, Fisher said, adding the firm is getting more plant production per square foot because of the sale of larger systems. Prime recently added 75,000 square feet to its facility in Framingham, Mass.

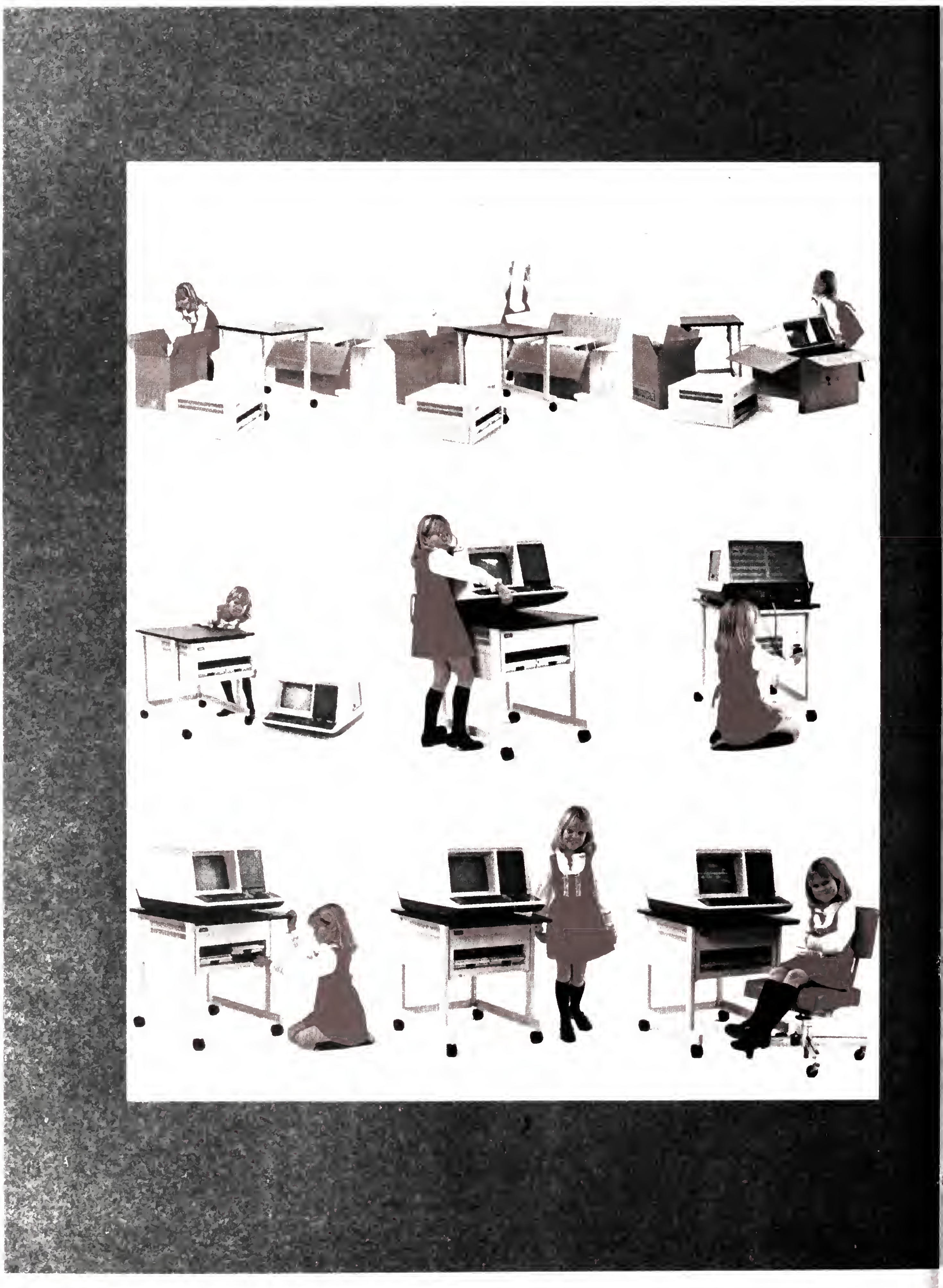
During 1976, sales doubled to $22.8 million from $11.4 million, largely as a result of the sale of larger systems and an expansion of the marketing organization from 74 persons at year-end 1975 to 214 persons at year-end 1976, the report said.

Gross margin increased to 54.6% in 1976 from 49.1% in 1975.

Cost of sales as a percentage of revenues fell from 50.9% in 1975 to 45.4%. Although expenditures for product development and engineering increased in dollars to $1.6 million in 1976 from $876,000 in 1975, they decreased as a percentage from 7.7% to 6.9%, the report indicated.

However, Bill Poduska, vice-president, research and development, said in an interview that R&D expenditures are expected to track around 7% of sales or a bit higher, since marketing expenditures are not expected to grow at their previous rate.

Prime's international order rate has been holding at 40%, despite economic problems in various countries, Fisher said.



Established Firms 'Missed Retail Boat,' Panel Agrees

By Toni Wiseman
Of the CW Staff

DALLAS — Almost every company that has a significant place in the retail DP market today was not in business three years ago, while those firms which have been around for years missed the "retail store boat," according to a panel at a conference here recently.

"Most companies have imagination only once in their careers," Adam Osborne of Osborne & Associates, Inc. said, suggesting the larger, established firms did not have the vision to see the opportunities of a new market.

This new market, Osborne noted, is not wide in terms of functions of new products, but rather new functions or applications of old products.

'Crazy Like Foxes'

When Mits introduced its $500 kit, everyone thought the firm was "nuts," he said. "They were — crazy like foxes."

And Icom, when it began selling peripherals, had to pay cash for the floppies because its supplier [illegible]

Pertec, though [illegible] company's prospects [illegible] months [illegible] "Pertec [illegible] Icom for [illegible]" Osborne pointed out.

Missed Chance

In these [illegible] the established [illegible] companies [illegible] market, but they [illegible] realize the [illegible]

Quick Millionaire

[illegible]

The company might [illegible] the intriguing idea that in the future, computers will be free just as Gillette sells blades and gives away razors.

Digital introduces DECstation. A big computer system that's small enough for anyone.

Digital put an amazing LSI version of the PDP-8 inside a DECscope, added some ingenious interconnecting devices and created something new. The DECstation. A complete computer system big enough to do all kinds of work and small, simple and inexpensive enough to do it for almost anyone.

DECstation. A complete computer system in disguise. It looks like a terminal, but look again. The DECstation has a powerful general purpose computer, a video terminal, a dual diskette drive, and its own special operating system. What's more, you can hook up two different printers and a second dual diskette drive. Then put the whole thing in a mini-desk, and when you're done you'll have the smallest big computer you've ever seen.

The Video Data Processor. It's the big reason the DECstation's so small. The VT78 Video Data Processor is a computer wrapped in a terminal. Inside the familiar DECscope you'll find an LSI version of the PDP-8 with 16K words (32K characters) of MOS memory and built-in interfaces. Two serial asynchronous ports feature speeds from 50 baud to 19.2 kilobaud. A disk port interfaces with up to 4 diskette drives. A parallel I/O port for printers and custom interfacing provides data transfer rates up to 180 kilobits/sec. All standard.

You can go from carton to computer in less than an hour. If you can push a button, you can run a DECstation. Because one button is all it takes to start things up. The bootstrap and self-test routines are built in.

Put it together, plug it in, and immediately you can begin to run anything from the PDP-8 software library. Which means you start with one of the most comprehensive sets of software tools available in a small system. Including two proven operating systems: OS/78 for stand alone applications and RTS/8 for real-time. OS/78, an extension of OS/8, supports a variety of languages, including FORTRAN IV and BASIC. So all you have to do is load the operating system and start programming your application.

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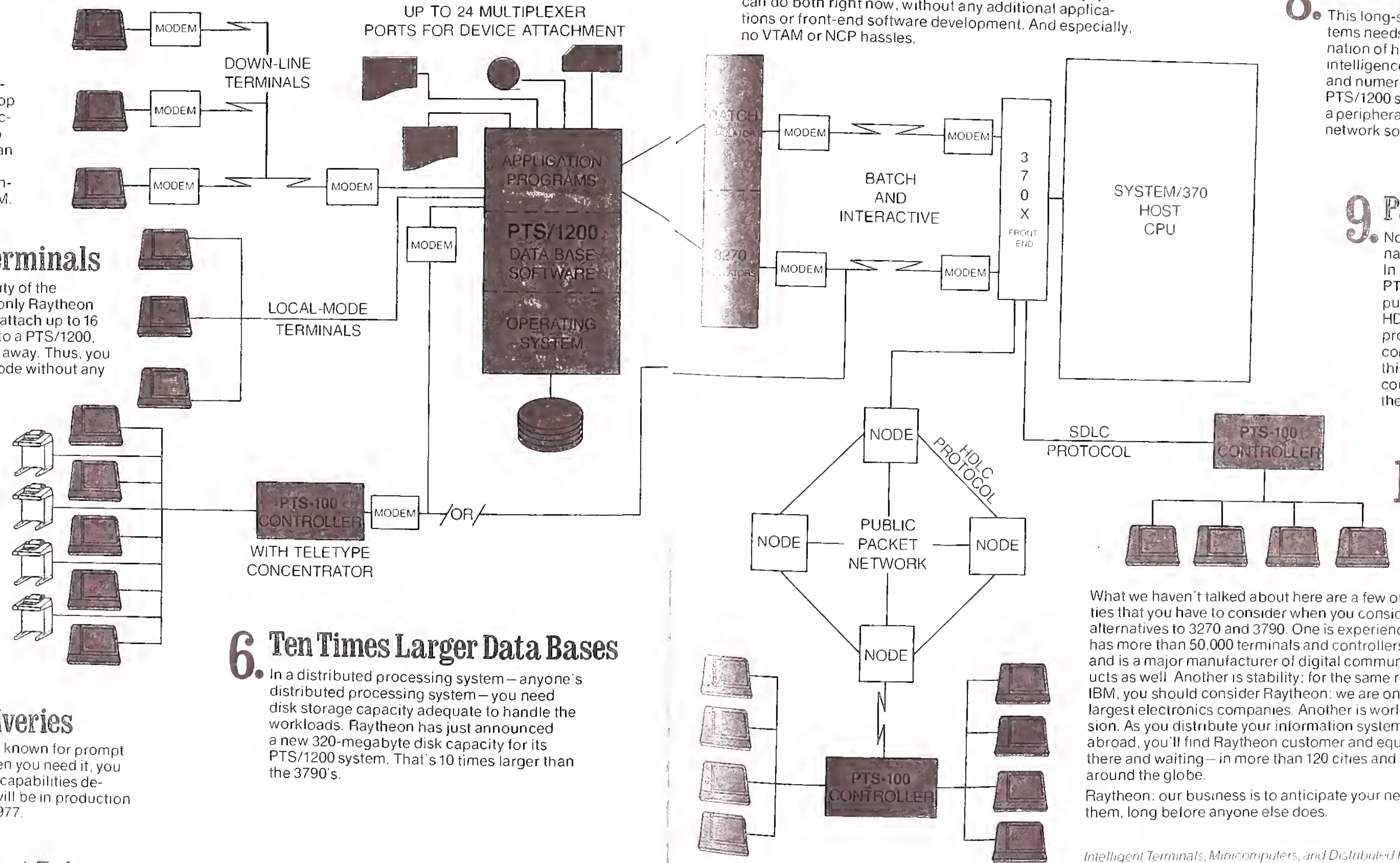
3270/3790 Users: There were always at least five good reasons to choose Raytheon. Now, there are at least ten.

In the past three years, Raytheon has become the largest independent supplier of intelligent terminal and distributed processing system alternatives for IBM 2260, 3270 and 3790 products. Better performance, better pricing, better delivery, greater flexibility and greater intelligence were the capabilities that Raytheon offered. The result: users like yourself purchased more than 20,000 Raytheon terminals and distributed processing systems.

In the past three months, Raytheon has been busily adding more and more capabilities to its PTS-100 intelligent terminal and PTS/1200 distributed processing systems. The reason: to give you more and more reasons to keep buying Raytheon.

Here are ten good ones. Watch this space in coming months for at least five more.



1. Downline Terminals

A brand new capability of our PTS/1200 system that lets you assign the task of multi-drop terminal control, and even applications processing, to a Raytheon system, rather than to your mainframe. Of course, the PTS/1200 can communicate in either batch or interactive modes – or both concurrently – to your mainframe as needed. You can't get this from IBM.

2. Local-Mode Terminals

A long-standing capability of the PTS/1200, and one that only Raytheon offers. It means you can attach up to 16 terminals in local mode to a PTS/1200, at distances up to a mile away. Thus, you get a network in local mode without any TP requirements.

3. Teletype Concentration

Announced two months ago, after more than a year of user operation, this unique feature lets you add teleprinters to the same transmission lines as your 3270-type terminals, with maximum performance and data rates preserved. Know anyone else with this $80 a month feature?

4. Immediate Deliveries

Raytheon has always been known for prompt delivery. We know that when you need it, you want it. There are five new capabilities described in this ad. All five will be in production by June 30th. This year – 1977.

5. Lowest Prices

A major attraction of Raytheon alternatives to 3270/3790 has been pricing. Even with IBM's recent price reductions, our pricing schedules permit you to obtain far more capabilities than IBM offers – at rental or purchase rates that are up to 27 per cent below IBM.

6. Ten Times Larger Data Bases

In a distributed processing system – anyone's distributed processing system – you need disk storage capacity adequate to handle the workloads. Raytheon has just announced a new 320-megabyte disk capacity for its PTS/1200 system. That's 10 times larger than the 3790's.

7. Simultaneous Interactive and Batch Communications

Two months ago, Raytheon demonstrated what no one else has – true 3270 concurrency. Our 3270 emulator lets you communicate interactively on a transaction basis with your host CPU. Our 2780/3780/HASP emulator package lets you – at the same time – communicate in batch mode. What counts about that is immediacy: you can do both right now, without any additional applications or front-end software development. And especially, no VTAM or NCP hassles.

8. Total Programming Freedom

This long-standing feature of Raytheon systems needs repeating. Because of the combination of high-level language, very large intelligence capacity, powerful macro routines, and numerous emulators, PTS-100 and PTS/1200 systems treat your host CPU like a peripheral. The result: data networks without network software development.

9. Packet Network Connection

Not with TTYs or ASCII-based terminals, but with 3270-type CRT devices. In March, Raytheon demonstrated its PTS-100 terminals operating on a U.S. public packet network under both HDLC line protocol and X.25 device protocol. We are the only major U.S. company operating such terminals on this international standard in other countries. Now we have it for you in the U.S.

10. SDLC Operation

And yes, every system in the PTS-100 family operates under SDLC protocol if you want it to. Or binary synchronous. Or HDLC. Or 1006. Or 2848/2260. Or Uniscope. Among many others.

What we haven't talked about here are a few other capabilities that you have to consider when you consider Raytheon alternatives to 3270 and 3790. One is experience – Raytheon has more than 50,000 terminals and controllers in use today, and is a major manufacturer of digital communications products as well. Another is stability; for the same reason you like IBM, you should consider Raytheon: we are one of the world's largest electronics companies. Another is worldwide dimension. As you distribute your information systems here and abroad, you'll find Raytheon customer and equipment service there and waiting – in more than 120 cities and 35 countries around the globe.

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CDC Defends Wisdom of Cyber Export to Soviet Union

(Continued from Page 49)

- A much clearer perspective is needed on the question of what constitutes significant output of a computer and on the role of the Cyber in activities of a strategic nature.
- This export involves no transfer of technology.
- There are many other considerations, including social and economic, which should be brought to bear on the decision.

Describing the global telecommunications weather forecasting network (Hydromet) proposed by the World Meteorological Organization, Schmidt noted the Moscow link is critical to the project's sucess.

Hugh P. Donaghue, a CDC vice-president, testified that the Moscow center currently is the lowest powered in the network, and the addition of a Cyber would do no more than bring that center into line with other regional centers.

Schmidt added that, in addition to a detailed set of safeguards to prevent unauthorized use of the computer, the power of the machine dictates that it be dedicated solely to the weather forecasting application.

"It is naive to believe that the Soviets are not rapidly developing an indigenous computer industry. A review of the literature will show that the installed base of computers in the Soviet Union was in excess of 25,000 in 1976 and that annual production is in excess of 5,000 systems per year," Schmidt noted.

Finally, Schmidt suggested several social and economic ramifications of the export.

Americans, for example, are generally uninformed about the vast Soviet resource of available technology that could provide solutions to such U.S. problems as improved energy conservation, greater environmental protection and more efficient water conservation, he said.

Cooperative ventures aside, Schmidt indicated that the single Cyber sale represents nearly 600 jobs for one year at CDC alone and more than 100 jobs at firms who supply parts to CDC.

"Seven hundred good jobs certainly are not insignificant, but they are but a small part of what will be denied in the aggregate," he said.

Schmidt estimated that in the next 10 years, the value of the Communist-installed computer base, exclusive of minicomputers, will be $43 billion, representing an $8- to $10-billion market opportunity for U.S. firms over that period.

By 1985, the U.S. could enjoy sales in excess of $2 billion per year — a level of 100,000 jobs, he noted. An additional $1.2 billion market, of 50,000 jobs, would arise in the peripherals area, he added.

"In addition to the competition from Communist Bloc countries, the Japanese and German competition is going to be tough during these years in both Third World and Communist Bloc markets.

"The decisions being made at this time will largely determine whether or not U.S. computer manufacturers will be able to achieve the potential reasonably available to them," Schmidt told the subcommittee, emphasizing that "denial of the export license for Hydromet will have adverse consequences on future U.S. computer sales."

Printer Shakeout Seen Coming

(Continued from Page 49)

said a shakeout is possible. The market is "getting very competitive, and it's easier to make printers, so a lot of firms are coming in."

Huch's approach is to pick a particular niche in the market and concentrate on it, rather than span a broad range of capabilities.

Although no American exhibitors on the floor were displaying ink jet technology, many indicated they are giving the concept some serious study.

Centronics is "taking a hard look at ink jet printing," Rea said. The firm intends to be a leader in printers and is looking carefully at that technology, he indicated.

Taniguchi said he thinks ink jet technology "will eventually make it," but is not here yet.

Joe Greenwood, marketing product manager for printers at Diablo Systems, said the firm plans to compete with IBM's ink jet technology but by using its daisy wheel and "some other techniques."

Tally expanded its line with a top-of-the-line 500 line/min printer and also added a teleprinter, the T1612, which includes an Intel 8080 and offers features such as a 4K buffer.

Centronics, known for its medium-speed printers, expanded in both directions — adding a 900 line/min printer and an electric discharge printer that operates at 180 line/min over 80 columns.

Data Printer chose to reenter the lower speed portion of its line-printer business with a 300 line/min Chaintrain band printer. Litvin explained the firm previously had a 300 line/min printer, but it did not gain market acceptance because of the price.

Dataroyal reconfigured its IPS-7 into the IPS-7000, which represents a 30% to 40% price reduction over the previous model, according to Huch.

Diablo showed its new 1660 terminal, which incorporates the firm's 200 char./sec matrix printer.

CCIA Sees Dangers In EFT Standards

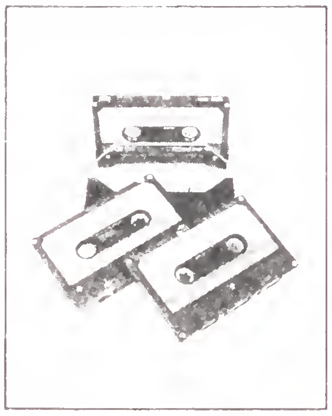
(Continued from Page 49)

ganization to sponsor and administer the national and international voluntary standards activities in EFT.

"Standards activities in EFT under the sponsorship of such an organization would be implemented in a speedy fashion in all federal EFT systems, thus creating a framework for inducing local statewide EFT systems to follow suit," the CCIA stated.

There are definite indications that the future viability of EFT may be in jeopardy if the issue of standards is not resolved soon, it added. In order for the EFT system to be profitable, it must have high usage and be accessible to a variety of institutions and system users. EFT will not be economical if separate terminals are needed for different credit cards, it stated.

The CCIA testimony recommended the development of voluntary national and international standards should be the shared responsibility of both the private sector and the federal government.



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Seeks Dominant Position

Cray Answering Scientific Arena's Cry for More Power

By Ann Dooley
Of the CW Staff

CHIPPEWA FALLS, Wis. — "We hold a dominant position in a narrow field and that's exactly where we want to be," according to Seymour Cray, president of Cray Research.

In the five years since Cray left Control Data Corp. to start his own company, he and his small staff have developed, manufactured and marketed the Cray-1, commonly referred to as a supercomputer.

The Cray-1 is intended to solve

Seymour Cray

complex scientific problems. It has the ability to process vector operations as well as high-speed scalar processing ability, according to the firm. It was also designed to perform "chaining," which enables operations to be performed on several sets of data at the same time.

The company offers three versions of the computer: .25 million-, .5 million- and one million word (all with 64 bit word) systems.

The Cray-1 consists of a mainframe and a Data General Corp. minicomputer console processor that doubles as a maintenance control unit.

It is considered an add-on computer rather than a replacement. It can be integrated into existing systems and further use of already functioning communication networks and peripherals, the firm said.

Leased Five Systems

In March 1976, the company went public and since then has leased five Cray-1 computers. The first went to the National Center for Atmospheric Research in May 1976.

Cray has also leased systems with 1-million word memories to the European Center for Medium Range Weather Forecasting, the Los Alamos Scientific Laboratory and two such machines to the Department of Defense (DOD).

All Cray-1s contracted for so far have been for the one million word capacity, but in the one-year interim it takes for delivery, companies are sent the first developed Cray-1, Serial No. 1, consisting of a .5 million word memory.

"We hope to keep farming out the Serial No. 1 until each one-million-word machine is ready," according to John Carlson, director of finance.

Although several years ago some observers claimed there was not a large enough market for the supercomputers to survive, both competition and market have opened up, he said.

Previously, only Texas Instruments, Inc.'s ASC and CDC's Cyber 76 and Star-100 were on the market, but now the Burroughs Corp. Illiac IV, the IBM 370/195, the Goodyear Aerospace Staran and potentially the IMS Associates' Hypercube systems are around.

"Burroughs entering the market also indicates to us there is definitely a market out there," Carlson pointed out.

"We also feel there is an expanding market for the large users," he said. "There is already a cry in the scientific community for more power, some are even asking for more than Cray-1."

"It's our goal to satisfy that demand," he added.

Cray has estimated there are about 100 governmental agencies, educational institutions and corporations worldwide that are potential users of the Cray-1. "Most of our clients are governmental, but we are also hitting areas where funds are currently being appropriated," Carlson said.

Last year's drought has made weather research and forecasting agencies look for faster turnaround time, he said. Nuclear and energy research are branching out and are becoming more critical issues and alternatives, Cray noted.

"Oil research will also be increasing in the next few years after the price controls have been lifted," he said.

Demand for More Power

"Our customers already have lots of power and they're demanding more," Cray said. With their expanded usage, they have few alternatives and, for the money, they will be needing the Cray-1, Carlson said.

"But we obviously must have a broader line than the Cray-1," Carlson said. Cray is in the process of researching a new product line which might or might not be called the Cray-2, Carlson said.

The Cray-1 would be the middle of the line with some machines being smaller, some larger. There would definitely be an advancement in speed as well, Carlson said.

"Initially we see most of our machines being leased with options to purchase," he said. But the DOD has a 60-month installment contract with option to convert to a lease, he added.

The one-million-word Cray-1 sells for $7,995,000 with [illegible] error correction feature, [illegible] for a monthly fee of $210,500. [illegible]

Real Advantage

The real advantage [illegible] Cray-1 [illegible] later [illegible] computers," Cray said. [illegible] were built [illegible] the Cray-1.

"It's design [illegible] those preceding it," he noted.

"I left CDC because I wanted to pursue more aggressively [illegible] kinds of computers I wanted to build," Cray explained. [illegible]

Gerald Simpson (left) and Jeff Bowen [illegible] work on the Cray-1.

[illegible]

Orders & Installations

First Security Co., [illegible] banking operation in Utah, Idaho and Wyoming, has ordered Bunker Ramo Corp. System 90 teller terminals and associated DP and communications equipment.

Princeton Applied Research has ordered IMP-16L 300 CPU application cards and IMP-16L-006P random-access memory-programmable-read-only memory (RAM/Prom) cards from the Microcomputer Systems Group of National Semiconductor Corp. for use in its medical electronics equipment.

Bank of America Corp. has ordered a claims administration system from System Development Corp. to process employee health insurance claims.

The U.S. Army Computing System Support and Evaluation Agency has ordered a large-scale Control Data Corp. system centered around a Cyber 76 and a Cyber 173.

Computer Consulting Service, Inc. has ordered more than 100 Honeywell Level 6 Model 6/[illegible] minicomputers valued at over $3 million.

PCA International, Inc., producer of color portraiture, has installed a Burroughs Corp. B1726 system.

The Eureka Co. has installed a Harris Corp. 8770 intelligent terminal system to handle accounting and inventory control at its Bloomington, Ill., headquarters.

The *Philadelphia Evening Bulletin* has ordered a TMS-1 text management system from Digital Equipment Corp.'s Graphic Arts Group.

Southern Bell Telephone [illegible] Telegraph [illegible] has ordered [illegible] additional [illegible] microfilm retrieval system [illegible] directory assistance from [illegible] Electronics Co. [illegible]

The City of Monroe, Mich. has installed a Burroughs Corp. B1726 system, which will process a variety of municipal applications, handle the city's general accounting functions and prepare special reports.

The M[illegible] [illegible]

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By Comparing Trade Statistics

Study Uncovers Worldwide DP Appetites

By Bohdan O. Szuprowicz

[illegible]

…compared the Standard International Trade Classification (SITC) Code 714 figures, which include not only computers and peripherals but also statistical machines, calculators, typewriters and other office machines.

The reason is that, in many developing countries, trade data collection and publication lags two to three years behind the actual shipments and before they show up in the United Nations international trade statistics. Also, some countries report only aggregate figures such as Code 714, without [illegible] they are [illegible].

But Code 714 is a good indicator [illegible] we are looking at [illegible] IBM, which accounts for a predominant portion [illegible] manufactures [illegible] Code 714 sub-[illegible].

Looking at a total of 128 countries, [illegible] ranked 50 of the largest importers and also indicated their exports, if any, in this product category. Interestingly, 39 of the top importers are also exporting office machinery, although only nine export more than they import.

Not surprisingly, France is not among the latter few, but it still is the fifth largest exporter of such products in the world.

Perhaps even more interesting is the fact that the U.S. is also one of the top importers of office equipment in the world, accounting for over 10% of all the trade and holding the third place behind France and West Germany.

The U.S. is often believed to have a global monopoly of this market. However, although it is the largest exporter of office equipment in the world, it only accounts for about 30% of the total international trade.

Off-Shore Factor

Much of the exports from such countries as Germany, France, Sweden, the UK and Japan are also IBM computers and peripherals manufactured in those countries. Other American firms, such as Burroughs, Honeywell, Control Data Corp. and Univac, also manufacture some of their equipment in foreign countries and export it to other world markets as well as to the U.S.

Nevertheless, whatever the product label on the equipment, it is the manufacturing country that derives the most benefits in form of employment, taxes, duties and markets for supplies of materials and services.

Because DP equipment manufacture is a labor-intensive industry, there is every reason to believe that proliferation of computer and minicomputer manufacturing firms will continue, particularly in less industrialized countries with large populations.

Countries with high import levels of office equipment products also have strong incentives to develop domestic products because they can reduce their often persistent trade deficits, develop their own technological base and even engage in exports of their equipment -- not to mention expanding employment and training opportunities for part of their labor force.

Looking down the list of the top 50 importers, Canada and Australia are clearly two immediate candidates for expanding their DP equipment manufacture. Even though both are developed countries, their imports are relatively large and substitution of domestic products could support a sizable manufacturing firm.

The Soviet Union, which imports as much as Australia, is not truly comparable because most of that market is prearranged by bilateral agreements between communist countries and because only a small percentage represents imports from the West. Nevertheless, the size of Soviet imports is a good reason why the Soviet Union wants to protect its huge computer market and develop its own industry to the point where it can also compete for other markets in the world.

But talking of communist countries, it is perhaps worth looking at the enviable position of East Germany, which is the seventh largest exporter of office equipment in the world and shipped over 10 times as much as it imported in 1974. Much of this trade at present is with the Soviet Union and East Europe, but some East German office equipment is already sold throughout the world.

Brazil, Spain and Mexico clearly have a lot to gain by getting into computer equipment manufacture in a big way. Most developing countries will of course continue to import some large and special systems forever. Increasingly, however, they will be manufacturing small machines, minicomputers and peripherals which are in demand within their own and neighboring countries.

Despite the benefits of ready-made equipment and IBM service, more countries will find they have many good reasons to make an effort to fight and switch.

Top 50 DP Import Markets

(In Millions of U.S. Dollars for 1974)

SITC Trade Classification Code 714 Product Category

Rank	Country	Imports	Exports
1	France	971.0	643.9
2	West Germany	967.1	1,507.7
3	USA	926.7	2,698.8
4	UK	816.4	845.6
5	Italy	535.9	437.2
6	Canada	519.8	286.6
7	Japan	492.2	727.0
8	Netherlands	357.8	268.3
9	USSR	230.9	85.9
10	Australia	230.7	17.0
11	Belgium-Lux.	222.7	126.2
12	Switzerland	208.7	113.8
13	Brazil	206.0	97.0
14	Spain	205.2	34.7
15	Sweden	181.1	278.5
16	Mexico	147.4	36.3
17	Czechoslovakia	137.6	62.9
18	Poland	110.5	60.0e
19	Austria	110.3	22.7
20	South Africa	101.6	
21	Denmark	99.8	34.9
22	Hong Kong	82.8	31.7
23	Finland	80.2	2.9
24	Hungary	79.6	33.5
25	Yugoslavia	68.8	7.4
26	Norway	55.4	10.9
27	Argentina	50.0	32.3 (73)
28	Singapore	46.8	139.7
29	Venezuela	46.3	na
30	Ireland	43.9	47.3
31	Bulgaria	43.5	30.0e
32	Iran	39.2	na
33	New Zealand	37.3	0.1
34	Portugal	36.6	28.1
35	Romania	33.8	24.3 (73)
36	East Germany	33.0	378.8
37	Israel	30.5	9.8
38	South Korea	29.2	40.7
39	Philippines	19.6	na
40	Turkey	17.8	0.0
41	Malaysia	17.2	na
42	Greece	14.6	0.1
43	Colombia	13.8	0.6
44	Algeria	13.6	na
45	Peru	12.6	na
46	Indonesia	11.5	na
47	Thailand	10.1	na
48	Saudi Arabia	10.1	na
49	Nigeria	9.9	na
50	India	9.7	4.5

International News

Foreign Orders & Installations

C.A. la Electricidad di Caracas has ordered a Supervisory Control and Data Acquisition System from Honeywell Information Systems to monitor and control supervisory equipment at distribution stations in Caracas, Venezuela.

Keen Kraft Music, Ltd., which operates outlets in Calgary and Edmonton, Canada, has installed an NCR Corp. 399 minicomputer, two NCR 260 communications terminals and two NCR electronic cash registers.

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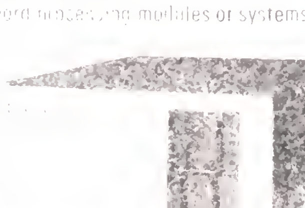


IBM Makes No. 10 on Forbes List, No. 8 on Fortune

NEW YORK — The Forbes 500 listing of large industrials is perhaps less frequently referenced than the Fortune 500 list, but it is equally complete and, in addition, interesting because the two publications' rankings vary considerably in some instances.

Forbes, besides ranking companies by assets, sales and earnings, has also compiled a listing by the firms' chief executives' total remuneration.

For convenience and comparison, the Fortune 500 ranking for each firm [CW, May 16] has been included in parentheses.

Forbes ranked IBM tenth (8) in sales, down a notch from its No. 9 position last year. The giant was, however, first in market value, fourth (3) in earnings and 19 (5) in assets.

Sperry Rand dropped three spots in the Forbes ranking to 82 (62) despite a 5.3% gain over last year's sales.

Teledyne fell eight places to 113 (115) with a 6.8% growth in earnings while Honeywell plummeted from No. 35 to 124 (88) accompanied by a 9.6% decrease in sales compared with 1975.

NCR dropped back one place to 134 (96) while Control Data Corp. rolled back eight places to 160 (173). Burroughs, on the other hand, with an 11.6% gain in sales, rose six places to 171 (120) and Texas Instruments leaped 30 slots to 198 (133) with its 21.3% sales increase.

A 13.3% sales increase moved Hewlett-Packard up seven places to 390 (200) while a 37.9% increase put Digital Equipment Corp. back on the Forbes list at 436 (280).

DEC did not make the top 500 last year.

Finally, Lear Siegler dropped down eight places to No. 460 (292).

Executives' Remunerations

Harold Geneen of International Telephone and Telegraph drew the fattest paycheck of any U.S. chief executive — $263,000. His total remuneration, which included salary, bonuses, director's fees and deferred compensation, totaled $990,000.

In the [illegible], IBM's Frank T. Cary drew [illegible] — $[illegible],000 in salary [illegible] $595,830 total remuneration [illegible], however, only the 2[illegible]th highest paid U.S. executive out of a pool of 798.

Burroughs' Ray W. Macdonald ranked 36, with $525,000 in remuneration. Texas Instruments' Mark Shepherd Jr. ranked 87 with $441,409. TRW's Horace A. Shepard and Sperry Rand's J. Paul Lyet are 109 and 110 with $419,895 and $419,419 respectively.

Edson W. Spencer received $399,500 from Honeywell, making him the 124th highest paid executive, while NCR's William S. Anderson was 137th with remunerations of $290,000.

William C. Norris of CDC ranked 292 with $288,47[illegible]. DEC's Kenneth H. Olsen ranked 364 with $[illegible] and Data General's Edson deCastro ranked 792 with $[illegible].

Financial News

Acquisitions

A.C. Nielsen Co., international business services firm, has acquired **Coordinated Management Systems, Inc.**, which specializes in the development of computer-based interactive marketing information systems.

Automatic Data Processing, Inc. (ADP) has acquired **First Data Corp.** and filed an S-14 registration statement with the Securities and Exchange Commission in connection with the acquisition, covering 302,334 shares of ADP common stock.

Nixdorf Computer AG has acquired **Entrex, Inc.** for $22 million in cash.

Informatics, Inc. has acquired the **Direct Dial Data System** from Greyhound Computer Corp.

Sun Information Services has acquired **Applied Financial Systems, Inc.**, which specializes in providing DP to bank trust departments.

May and Speh Data Processing Center, a division of System Development Corp., has acquired the **Chicago Data Center** of Greyhound Computer Corp.

Memorex Corp. has acquired **CFI Memories, Inc.** and its parent company, **Lencor International**. Terms of the sale call for payment of $2.4 million in cash and 200,000 shares of Memorex stock to Lencor stockholders.

Sycor, Inc. has terminated previously announced discussions aimed at purchasing an interest in three European computer companies, CMC France SA, Computer Machinery Deutschland GmbH and a minority share of Computer Machinery Co. of England.

New Registrations

SCIENCE APPLICATIONS, INC., 1200 Prospect St., La Jolla, Calif. 92037, a scientific applications computer firm, filed to register 72,500 shares of common to be offered by certain selling shareholders to employees and consultants of the company. No underwriter is involved.

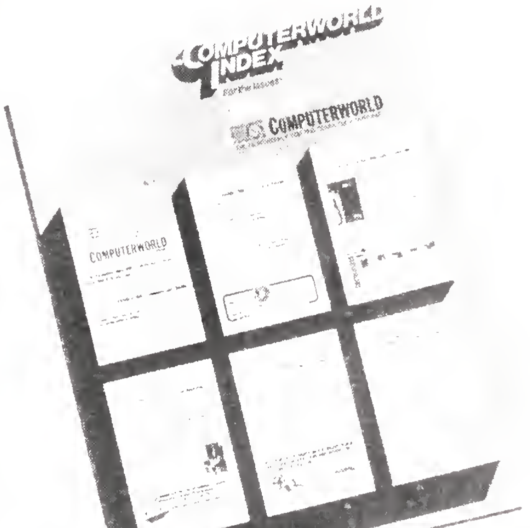
EG&G, INC., 45 Williams St., Wellesley, Mass., a scientific and technically oriented computer firm, filed to register 387,513 shares of common issued in connection with the acquisition by EG&G of Reticon Corp. on Dec. 28, 1976. The selling stockholders have advised EG&G they propose to sell, from time to time, all or part of the shares offered by them in private principal transactions and through brokers.

HONEYWELL, INC., Honeywell Plaza, Minneapolis, Minn. 55408, filed to register 1.4 million shares of common which may be sold from time to time, at prices and at terms then obtainable, on the New York Stock Exchange or other security exchanges, in the over-the-counter market in negotiated transactions or otherwise by or for the account of General Electric.

EG&G, INC., 45 Williams St., Wellesley, Mess., a scientific computer firm, filed to register 549,473 shares of common to be offered in exchange for the outstanding common stock of Princeton Applied Research Corp., Princeton, N.J., at the rate of .587 EG&G share for each Princeton share. No underwriters are involved.

AUTOMATIC DATA PROCESSING, INC. (ADP), 405 Route 3, Clifton, N.J. 07015, a computer service firm, filed to register up to 302,345 shares of common. It is proposed to offer these shares in connection with the acquisition of First Data Corp. through the merger of a wholly owned subsidiary of ADP with and into First Data. Upon the merger, each outstanding share of First Data common stock will be converted into .4529 ADP share and each outstanding share of First Data preferred will be converted into 22.645 ADP shares. No underwriter is involved.

DATA 100 CORP., 6110 Blue Circle Drive, Minnetonka, Minn. 55343, a remote data processing firm, filed to register $10 million of convertible subordinated debentures due 1992. They will be offered by the company through underwriters headed by Dean Witter & Co., Inc., 33 N. Dearborn St., Chicago, Ill. 60602.



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• There are entries by *industry*, like *INSURANCE*, under which there are 17 entries for various stories on the use of computers in the insurance industry.

• *Types of computer applications* is another way you can look something up in The Index. The category *INVENTORY SYSTEMS*, for example, has 21 entries.

• *Regulatory, security and social issues* are also indexed. There are 34 entries under *PRIVACY*, 10 under *PRIVACY ACT* and 9 under *PRIVACY PROTECTION COMMISSION*, for example.

• The Index also makes it easy to look into *legal aspects of computer use* with categories like *LITIGATION*, which has 24 entries in the last six months of 1976.

• Even *foreign countries* are indexed. The category *JAPAN*, for example, has 9 entries.

• . . . and there are *others*. *KIT COMPUTERS* (the kind you build yourself) are the latest thing, and The Index shows 5 entries. *POINT-OF-SALE SYSTEMS* has 14 entries . . . and there's much, much more.

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SYSTEMS SOFTWARE SYSTEMS SOFTWARE
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Omicron has extensive needs for Systems Software Professionals in the SAN FRANCISCO BAY AREA and in several cities throughout the U.S. such as Seattle, Minneapolis, St. Louis, Boston, Tulsa and Houston.

Typically, our Client Companies require large scale IBM/370 background and systems software such as MVS, JES3, SVS, VM or IMS. Salaries to $30K. If you're skilled in any of the above systems, and you're looking for new challenges and opportunities, please phone or write, in confidence, to:

OMICRON Inc.
415/546-7200
ONE ECKER STREET
(Ecker & Stevenson Streets)
SAN FRANCISCO, CA 94105

Exclusively Employer Retained Agency
Our fees, relocation and interviewing expenses are paid by our Client Companies.

SENIOR AUDITOR

CBT is seeking an experienced auditor to conduct operational audits of the bank's computer center and its computerized applications with a minimum of supervision.

The successful candidate will possess a college degree in business administration of related area and have 1-2 years of experience. Knowledge of data processing, computer systems and programming, and/or use of audit software packages will be helpful.

If your background meets our needs, send resume, in confidence, to Steven Bell, Manager Professional Recruitment.

The Connecticut Bank and Trust Company

1 Constitution Plaza, Hartford, Connecticut 06115

an equal opportunity employer m/f

SOFTWARE SPECIALISTS

Boeing Computer Services, Inc., in Seattle, Washington is seeking experienced computer professionals for important assignments in the following areas:

COMMAND AND CONTROL/REALTIME SYSTEMS

- Design, development and test of Realtime software for command and control weapons systems, communications systems and ground support.
- Development of simulation and training software for Realtime surveillance systems.

COMPUTING METHODS AND TECHNOLOGY/SYSTEM DESIGN AND ANALYSIS

- Design, development, programming and formal documentation of the Realtime executive component of a large, complex command and control system.

DATA ANALYSIS SYSTEMS

- Development of interactive graphics software using a TEKTRONIX 4051 interfacing with a CDC 6600.

SOFTWARE TEST AND VERIFICATION

- Development, verification, qualification and formal documentation of software test requirements and procedures.

MINI-COMPUTER SYSTEMS SPECIALISTS

- Mini-computer application analysis, system design and software analysis for data reduction acquisition data entry, data base management and output processing.
- Design DC mini-business and scientific systems. Experience with Realtime mini-computer simulation of missile flight dynamics and analysis of radar data and message switching.
- Development, maintenance and preparation of comparative analyses of mini-computer software and operating systems.

OPERATING SYSTEM PROGRAMMERS

- Maintain NOS 1.0 or KRONOS 2.1 operating systems.
- Requires in-depth knowledge of CDC 6600, CYBER 70 and 170 hardware.

COMPUTER AIDED DESIGN/MANUFACTURING

- N C Systems Analysts and Programmers to integrate the APT system with Process Control Computer Systems.
- Systems Analysts for design and maintenance of N C distributed system software.
- CAD CAM Software Designers to design and implement software to integrate CAD CAM interactive mini-computer graphics systems with large scale computers.

DATA BASE DESIGNERS/ANALYSTS

- To design, develop and implement physical and logical data base applications using IMS, IDMS, System 2000, CICS, or distributed processing.

DATA PROCESSING INSTRUCTORS

- Requires experience in Structured Programming Design or IMS.
- Instructor experience desired.

Attractive salary, fringe benefits and moving allowances will be offered qualified candidates. And living is a pleasure in the unspoiled Northwest with its many recreational and sports activities and relaxed life-styles.

Look into these outstanding opportunities.

Send your detailed résumé to The Boeing Company, P.O. Box 3707-JHU, Seattle, WA 98124

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BCS BOEING COMPUTER SERVICES, INC.

FLORIDA INTERNATIONAL UNIVERSITY

Director
University Computer Center

Florida International University at Miami is an urban upper division, multi-campus university, serving 2.8 million residents of Southeast Florida. The computer center is part of a growing statewide computer network and supports a large number of computer-intensive academic programs, extensive administrative applications, and a growing research activity. Hardware and operating systems support is provided via the Southeast Regional Data Center and by the Northwest Regional Data Center with Univac 1108 and IBM 360 equipment respectively.

Requirements. Bachelor's degree in accounting, management, computer science, mathematics, industrial management, or other closely-related fields with extensive training in computer concepts; seven years experience in electronic D.P. work or any equivalent combination of exoerience and training in all phases of computer facility operations. This management position requires extensive managerial and supervisory experience with heavy emphasis on systems analysis and programming, preferably in an educational environment. Salary low to mid-twenties based upon credentials and experience. A letter of application and resume should be submitted no later than July 29th. Direct materials to the chairperson, Search & Screen committee for Director of Computer Center, Florida International University, PC 510, Tamiami Trail, Miami, Florida 33199.

An Equal Opportunity/Affirmative Action Employer
A Member of the State University System of Florida

Keytronic Corp. is opening offices in New York, N.Y., Boston, Ma., and Dallas, Tx. Positions available include data processing sales, and service representative.

Sales — Experience in data processing sales, banking OCR (optical character recognition) technology and/or OCR peripheral add-on equipment, (system sales), heavy commission.

Service — Basic requirements include an A.A. degree or equiv. and 1 year of testing Digital Electronic Equipment excellent benefits package included.

Send resume and salary requirements to:

Personnel Dept.
Keytronic Corp.
P.O. Box 14687
Spokane, WA 99214
We are an Equal Opportunity Employer

SYSTEMS AND PROCEDURES ANALYST
(CRIMINAL JUSTICE SYSTEM)
(Hillsborough County, Fla.)

Challenging permanent position. Implement Justice MIS for Hillsborough Co. Requires Bachelors degree with major study in a field related to data processing plus three years programming and/or systems design experience. OR high school and seven years in data processing, or equivalent combination of experience and education, with a minimum of three years programming and/or systems design experience. Criminal Justice experience is preferred. Annual salary: Start $15,870, advanced to $23,400 with longevity and merit. Civil Service benefits. Apply with: Hillsborough County Civil Service, P.O. Box 1110, Room 273, County Courthouse, Tampa, Florida 33601. An EOE.

Computer Sales Professionals are invited to unveil a new career with the Sperry Univac BC/7 Business Computer

The Sperry Univac BC/7 is a brand new, inexpensive, easy to use business computer for the application systems solution marketplace that provides the power of a large scale operating system. It's been just 4 months since the introduction of this fantastic product and already, the business community has responded with unprecedented demand for purchases, demonstrations and further information. We attribute this "boom" to our marketing strategy involving • top dollar advertising • direct mail campaigns • seminars • the Sperry Univac image • a hustling, well-informed, well-trained sales force. Putting it mildly, our sales team is getting their fair share...why not get yours?

In order for the BC/7 to achieve the stardom that is its destiny, we're focusing the spotlight on successful computer professionals like yourself.

To qualify for a spot on the BC/7 marketing team, you'll need a proven track record as a successful, ambitious, hard working, strong closing computer sales professional. Managerial potential would be a definite plus, because you'll be given every opportunity to advance toward that direction if you so desire.

As far as compensation is concerned, our program is the envy of the industry. It consists of salary + commission + expenses + benefits. Our people do well here, and so will you.

You may never again be faced with an opportunity to assume an exciting new role that combines the dynamics and growth potential of a new venture with the solidarity of an established industry giant.

Openings in 20 Major Cities with Districts soon to be open in:

Buffalo Charlotte Columbia, Md. Hartford
Long Island Milwaukee Seattle

If you're interested in us and you meet our requirements, we're interested in you. You may contact our representative by calling 1-800-821-7700, ext. 307 toll free ALL DAY SUNDAY, MONDAY-FRIDAY, 9am-5pm. Or you may prefer to send your resume or letter of interest to Mr. Juris C. Peice, Manager-Employee Relations, Sperry Univac, Business Systems Marketing, P.O. Box 500, Bluebell, Pa. 19422.

SPERRY UNIVAC

Sperry Univac is a division of Sperry Rand Corporation
Making machines do more so man can do more
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POSITIONS AVAILABLE NATIONWIDE
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Senior Programmer to $20,000
IMS, Panvalet, and COBOL experience in the insurance industry.

Application Programmerto $18,000
370-Os, JCL and COBOL experience

Systems Analyst to $20,000
Experience in IBM 370 or UNIVAC 1100 series.

Positions available in the South, Midwest and Southeast;

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PARKER PAGE ASSOCIATES
P.O. Box 12308
Seattle, WA 98111
Offices: Seattle, Wash., D.C., Michigan, Atlanta

INSTRUCTIONAL PROGRAM COORDINATOR AND DATA BASE MANAGER

Two-Thirds of Time Assigned to School of Business
1. Coordinate information systems program.
2. Teach two courses per semester.

One-Third of Time Assigned to Computer Center
1. Data base manager.
2. Provide staff leadership in IMS project.

BACKGROUND REQUIREMENTS:

ACADEMIC:
Doctorate in Information Systems or related area (ABD with Dissertation Chairman's recommendations).

INDUSTRIAL EXPERIENCE:
Systems and programming; Data base management; structured top-down technique; programming in high-level language.

RANK:
Assistant/Associate Professor

SALARY:
Commensurate with education and experience, AACSB median.

CONTRACT YEAR:
Full year, starting August 22, 1977.

CONTACT:
Dr. Roland Spaniol, Director
Computer Center or
Dr. Thomas O. Jones, Jr.
Dean, School of Business
Eastern Illinois University
Charleston, Ill. 61920
(217) 581-3227 or (217) 581-3526
Eastern Illinois University is an Equal Opportunity/Affirmative Action Employer. Applications from women and minority candidates are encouraged.

EDP AUDITOR

Immediate opening within our Internal Auditing and Performance Review Division. The successful candidate should possess a degree in EDP or Accounting with a broad background in EDP, Auditing, Systems Analysis or Programming. A working knowledge of COBOL and IBM hardware capabilities and system design is also required. Responsibilities include performing operational audits of data processing activities, evaluating internal control and security of systems in use and under development; assisting other audit teams in providing EDP audit support and developing and maintaining audit software programs. We offer an outstanding employee benefit package and a salary commensurate with experience. Send resume in confidence stating salary required to:

Blue Cross and Blue Shield of Maryland
700 E. Joppa Road
Baltimore, Maryland 21204
E.O.E./M/F

Product Group Exec. Data Comm
$60-70,000

Position is with top 20 Fortune 500 company. Will work with european business systems subsidiary (500 million). This NYC headquarters post is responsible for general corporate product planning in the data communications area. Seek experience in main frames, peripherals, minis, etc. In the U.S. will be concerned with product penetration, acquisitions, strategic planning. Will consider impact of computers on communications, etc. Unique opportunity to move into a senior headquarters management and responsibility. Seek tech degree plus product planning and marketing exposure. Resume in confidence to Mr. E. Busti.

FPH

F. P. Healy & Co.,Inc.
Management Consultants
630 Third Ave., N.Y., N.Y. 10017

CONSULTANT, COME HOME!
Corporate Controller

We're looking for a CPA and/or MBA who's looking for a home. You're probably the number two man in your organization right now. Or maybe you're in the top position, but you're lacking a challenge and a future. In any event, we're offering an exciting career opportunity.

We are a large sales organization, located in an attractive upper-Midwest suburb. We need someone to direct all our financial activities and manage our accounting staff. You must be systems oriented and have a history of innovative problem solving. You'll also control all of our computer operations, including integration of a brand new system.

More than anything else, you'll be involved in a fast paced organization, making decisions and taking full responsibility for those decisions.. You'll find this an unusually interesting opportunity, with a compensation package designed to attract a top level professional.

Our needs are immedaite, so send your detailed resume in strictest confidence to:

CW Box 5104
797 Washington St.
Newton, Mass. 02160

DIRECTOR OF INFORMATION SYSTEMS

We have an opportunity and a challenge for a manager to direct the growth of a department to a level of 15 to 20 people. We are completing a 5 year plan for an integrated information system and expect to choose soon new and larger computer equipment.

We prefer a business manager with an MBA degree. Information systems experience and a manufacturing orientation are important. Past participation in the advancement of a computer department will be a consideration.

The salary depends on you; a starting level in the mid $20's is expected.

Ours is a medium-sized, growing manufacturing business based in Central Ohio, with 6 product lines, 5 plants, and national and international markets.

Please send your detailed resume to

CW Box 5106
797 Washington St.
Newton, Mass. 02160
An Equal Opportunity Employer M/F

Local Interviews

Data Processing Professionals

San Francisco, Houston, Los Angeles, and Gaithersburg, Md.

Bechtel, an international leader in the field of engineering and construction management, has several excellent opportunities available for:

Senior Systems Analysts
Development of major data base oriented Personnel systems. 5 or more years' directly related experience required which includes project planning and professional systems documentation.

Programmer/Analysts COBOL/FORTRAN/RPG II
Design and implement business or project management applications and provide maintenance and enhancements on existing systems. 3 or more years' directly related experience utilizing one or more of these languages is required.

Engineering Programmer/Analysts
Development, enhancement, and user support for engineering analysis applications. FORTRAN proficiency, with 2 or more years' directly related experience, and an engineering degree or physical science degree is required.

Senior Systems Programmer
Maintain UNIVAC 1110 operating system. Design, code, test, and document sizable modifications. 3 or more years' directly related experience is required.

To arrange a local interview in early July, please call **Marshall Collins (collect) at (415) 768-9174, 9AM–4PM PDT,** or mail your resume including salary history and geographical preference immediately to: **M.B. Collins, Professional Staffing Department No. 15-7A-7, P.O. Box 3965, San Francisco, CA 94119.**

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BECHTEL

MAKE THE RIGHT MOVE

You're time is now. You've paid your dues and you're ready for the next step. You can be sure that step is in the right direction with Teledyne Brown Engineering. A well established company in Huntsville, Alabama, Teledyne Brown has several openings for experienced data processing professionals.

PROGRAMMERS
You'll be developing simulation, data reduction, and test control software on large mainframes and minicomputers. A B.S. in Computer Science, Physics, or Engineering and at least five years of programing experience including work in assembly language are prerequisites for success.

TEST PLANNERS AND DATA ANALYSTS
As testors, you'll plan software tests and analyze resulting test data. A B.S. in Computer Science, Physics, or Engineering and a minimum of three years experience in testing large real-time software packages are musts.

SYSTEMS ANALYSTS
You'll be analyzing hardware architecture and systems performance, writing high level requirement specifications, and projecting future technology requirements. A minimum of three years in designing processing algorithms and developing or analyzing processor system requirements and technology trends are critical. BS Computer Science, Physics, or Engineering required.

SYSTEMS SOFTWARE DESIGNERS
This is your chance to enter the stimulating world of computer graphics. Your work will include writing specs, designing, and developing interactive graphics on a mini. You'll also develop a high level simulation language compiler. A BS in Computer Science or Engineering and three years in systems software should back up your creative instincts.

DP METHODOLOGY DESIGNERS
If you have a knack for software efficiency, this is the spot. As our resident methodology expert, we'll be looking to you for strategies that optimize data processor designs and reduce related time and costs. Primary concentration will be on partitioning techniques for distributed systems, approaches to incremental development, specification languages, coding practices, Science, Physics, or Electrical Engineering, coupled with experience in data processor and software engineering research, we'd like to discuss these opportunities.

Please submit your resume and recent salary history for immediate consideration to:

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TELEDYNE BROWN ENGINEERING

Cummings Research Park
Huntsville, Alabama 35807

PROGRAMMER

Immediate opening for a programmer position in our St. Louis home office for an individual with a minimum of 2 years COBOL experience. This individual will be performing challenging application programming on our insurance system using disc, tape and total data based, processing under O/S.
We offer a progressive benefit package and starting salary commensurate with experience. Qualified applicants are invited to send resume or letter outlining work history and salary requirements to:

CW Box 5105
797 Washington St.
Newton, Mass. 02160
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CSC

Engineer

Computer Sciences Corporation has the following career opportunity for work in the scientific environment of NASA Ames Research Center:

Simulation Engineer

BS degree in Engineering or Applied Physics, prefer 2-5 years related experience, FORTRAN programming skills desirable. Familiarity with one or more of the following specialties is essential: control systems, rotor systems, aeronautics, applied mechanics or graphic displays. Will provide applications programming and analysis support for simulations of conventional aircraft, helicopters, STOL and V-STOL aircraft.

For consideration, send your resume including salary history, in confidence to:

COMPUTER SCIENCES CORPORATION

1101 San Antonio Road
Room 202
Mountain View, CA 94043
ATTN: C. Lustig
(415) 965-3130
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COMPUTER PROFESSIONALS

The J. Preston Levis Regional Computer Center (JPLRCC) provides computing services for a number of users in northwest Ohio, including Bowling Green State University, the City of Toledo, the University of Toledo, and the Toledo/Lucas County Criminal Justice Regional Planning Unit. Batch, timesharing and real-time services are offered on an IBM 360/75 and a Univac 1110 2x1. JPLRCC is located south of Toledo in suburban Perrysburg, in an area with a full range of cultural and recreational opportunities, and has the following openings

DIRECTOR OF USER SERVICES

This position reports to the Executive Director and is responsible for all relationships with users, both through large user organizations and directly with end users. The staff which this position manages performs user consulting; applications systems design and programming; documentation and Newsletter preparation and distribution; user education; and library support. The successful applicant will have a Master's degree in a field related to computing or an equivalent combination of education and experience; at least five years of total experience in computing; have managed a group in the computing field; and have broad experience in all aspects of computing, particularly in a networking environment. Starting salary will be in the $20,000 - $25,000 range, depending on qualifications.

SENIOR SYSTEMS PROGRAMMERS (2)

Responsibilities will include systems programming support of Univac 1100 and/or IBM OS. Experience with both systems is highly desirable, but not necessary. The successful applicant will have at least 2 to 3 years experience in systems programming on EXEC 8 (1100-OS) or IBM OS or VS and be familiar with the respective SYSGEN process, and a bachelors degree or equivalent combination of education and experience. A proven ability to lead others as a project manager is also highly desirable. Starting salary will be in the $16,000-$20,000 range, depending on qualifications.

SYSTEMS PROGRAMMER

This position requires a versatile person who can handle projects on both the Univac and IBM systems. Knowledge of IBM JCL or Univac ECL, COBOL and FORTRAN, and an assembly language are necessary. The successful applicant will have 1-3 years of systems programming experience on either system, and a bachelors degree or an equivalent combination of education and experience. Starting salary will be in the $13,000 - $17,000 range, depending on qualifications.

In addition to the indicated salaries, a full fringe-benefit package applies, including 4 weeks of vacation and tuition-free continuing education. Applicants should submit a complete resume, salary history and a list of references no later than August 1, 1977 to Personnel Officer, JPLRCC, 25875 Dixie Hwy., Perrysburg, Ohio 43551. (JPLRCC is an EO/AA Employer)

computer hardware and software candidates...

RELAX

We have scores of openings in all parts of the U.S. Our fees are paid by hiring companies anxious to find qualified computer hardware and software candidates. Contact the nearest office for confidential service and let us do the footwork.

AVAILABILITY, INC.
Data Services Consultants
5401 W. Kennedy Blvd., Suite 285
Tampa, Florida 33609
(813) 872-2631

CAREER SPECIALISTS PERSONNEL SERVICES
4600 El Camino Real
Suite 206
Los Altos, Calif. 94022
(415) 941-3200

COMPUTER CAREERS INC.
Specialists-Data Processing
4720 Montgomery Lane
Suite 503
Bethesda, MD 20014
(301) 654-9225

D. BROWN & ASSOCIATES
Dorothy Spiegel DP Specialist
610 S.W. Alder, Suite 711
Portland, Oregon 97205
(503) 224-6860

WETERRINGS & AGNEW, INC.
425 Midtown Tower
Rochester, N.Y. 14604
(716) 454-3888

RANDALL HOWARD & ASSOC., INC.
5350 Poplar Ave., Suite 412
Memphis, Tenn. 38117
(901) 767-5150

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1280 Route 46
Parsippany, N.J. 07054
(201) 335-8700

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(904) 434-2321

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(215) 561-5522

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Proj Ldr-CICS DOS/VS 2 yrs exp $23K
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Syst Mgr-supervise 5 hands on exp $25-30K
Minority Sr Cnslnt 20% trvl Fort co $28K
Sr Syst Anal-security/comm/networks design $25-27K

Bill Borrelli (212) 349-3610
William Harris Assoc
150 Broadway agency NY 10038

UNIVERSITY OF VERMONT

SENIOR SYSTEMS ANALYST

The Office of Management Information and Computing is seeking a Senior Systems Analyst to coordinate the design and implementation of administrative applications under our integrated data base. Applicants must have a bachelor's degree and at least five years of DP experience, three as a Systems Analyst. Experience in COBOL and IBM/DOS are required. Applicants with higher education experience in on-line systems and DBMS are preferred. We offer an excellent benefits package; salary will be in the upper teens. Send resume and professional references by August 15 to the Personnel Department, Box 57Y, Waterman Building, University of Vermonth, Burlington, Vermont 05401.

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ANALYST/PROGRAMMER

Denver, Colorado Area

Jefferson County School District is seeking an Analyst/Programmer with a minimum of 4 years successful experience in analysis and design, programming, and maintenance of computer systems software using both COBOL and PL/I. Applicants must have completed a college degree in computer science, mathematics or statistics, or equivalent work experience. Additional experience with DOS/VS, CICS/VS, 370/148, and the ADABAS DBMS is desirable. Salary Range: $1100 - $1400 per month. Excellent benefits. Qualified applicants should send resumes to:

Dr. Nick Gangwish
Jefferson County Schools
Computer Services Department
13300 W. Ellsworth Avenue
Golden, Colorado 80401

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H-6000 SYSTEMS AND SOFTWARE PEOPLE

Exciting opportunity to join Control Data's OEM Mass Data Systems Software Development Group. This product is a major new development in computer industry.

GCOS SYSTEMS PROGRAMMER

We are looking for a GCOS Systems Programmer with wide experience in data processing. The ideal candidate will have a good working knowledge of the General loader and related functions, interpret master mode core dumps and be familiar with COBOL and the file system.

H-6000 SERIES GMAP PROGRAMMER

Experience in data processing and H-6000 Series software. GMAP, COBOL, and JCL experience are required for this position.

These opportunities are located in Minneapolis, Minnesota, a beautiful place to get involved in the future.

Control Data offers a liberal and compensation package. For further information send resume including salary history or call collect:

Bill Murray
Peripheral Systems Group
2200 Berkshire Lane
Plymouth, Minnesota 55441
(612) 553-4536

CONTROL DATA CORPORATION

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has placed over 1,000 people in these professional areas.

Openings now exist thruout the Eastern U.S. with all recruitment and relocation fees paid. For details contact Mr. Harris at

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(516) 466-6670

SR. PROGRAMMER/ ANALYST

Expanding MIS department of major investment bank with growth record. IBM 370/158 OS/VS II, CICS or IMS. $24,000 (FEE PAID)

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(212) 221-6500

INFORMATION SYSTEMS

Partial listing of fee paid positions in Atlanta, the Southeast, and Nationwide

Dir. of Information Sys. $40's
Corporate level positions. Consulting experience or teleprocessing a plus.

Programmer/Analyst $16,000 to $18,000
Manufacturing background. Capable of working independently.

Mini/Micro Prog. To $25,000
Manufacturing environment. Degree and assembly language experience required.

Programmer/Analyst To $20,000
Accounting and manufacturing applications. Univac equipment.

Programmer/Analyst To $20,000
Systems programming experience. IBM or Univac (RCA) equipment.

Current employment will be protected. Send resumes, including present and desired salary and relocation preferences to: JIM STAAL, Mgr. Information Systems Division

Whitlow & Associates
3390 Peachtree Rd. NE — Suite 438
Atlanta, Ga. 30326
404/262-2566

MODCOMP

MODCOMP is one of the most respected designers, manufacturers and marketers in the booming minicomputer industry. There's never been a better time to consider the outstanding career opportunities with MODCOMP.

SYSTEMS ANALYSTS

Corporate Headquarters, Ft. Lauderdale, Fla.

Chicago, Ill. and San Jose, Calif.-Regional Offices

Position requires experience in assembly language programming and operating systems. Fortran experience helpful. Successful applicants will support customers in implementing and solving problems in MODCOMP systems in a variety of applications by phone trouble-shooting and on-site customer support.

MODCOMP OFFERS EXCELLENT SALARIES, OUTSTANDING FRINGE BENEFITS AND A UNIQUE PERSONAL COMPENSATION INCENTIVE PLAN IN A RAPIDLY GROWING FIELD SERVICE ORGANIZATION.

To arrange convenient interview, please send detailed resume, including salary history to/or call:

Mr. Robert M. Coyner
1 (800) 327-8997

MODULAR COMPUTER SYSTEMS, INC.
1650 West McNab Road
Ft. Lauderdale, Florida 33309

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MODCOMP

PROGRAMMER/ANALYST

DataPhase Systems Inc., a rapidly-growing leader in interactive database applications, has several challenging positions on its software staff. Responsibilities include system development and implementation, field support, and interfacing with vendors and customers. Limited travel. Two year's active experience in programming, including experience with MUMPS or MIIS, would be preferable, as well as familiarity with minicomputer systems. Good communication skills required.

We offer an excellent salary and benefits program, with exciting opportunities for personal and professional growth.

Please call or write in confidence to:

Mr. Lloyd F. Botway
Manager, Systems and Development
DataPhase Systems Inc.
4528 Belleview
Kansas City, MO 64111
(816) 931-7927

EDP EXPANSION

FLORIDA COAST

Our client, a leader in the dynamic health care field, seeks DP professionals for newly created positions. Opptys req solid technical & personal qualifications. Degrees helpful, but not mandatory.

DATA BASE ANALYST

To $21,000. Need several. Reqs min 2 yrs COBOL prog bkgd using IBS Data Base Access methods combined w/1 yr DBD, PSB & ACB bkgd, IMS systems generation exp desirable.

SYS PERF ANAL

To $20,000. Reqs min 3 yrs prog bkgd utilizing Random Access File Structures, combined w/1 yr Pure Systems design.

SYS PROGRAMMERS

To $19,000. Need several, Reqs 2 yrs Systems Prog in OS/MVT, VS2R1 (SVS) or VS2R2 (MVS). Exposure to IMS DB/DC & CICS desirable.

PROG/ANALYST

To $16,000. Need several. Reqs min 2 yrs COBOL programming with knowledge of OS/MVS/JCL. Exp w/CICS a plus. All fees paid, including interview & relocation expenses to highly attractive Florida coast area. Reply in conf to J. Schwab, (704) 527-4980 or send resume to

FOX-MORRIS
PERSONNEL CONSULTANTS
4000 Park Rd.
Charlotte, NC 28209

DATA PROCESSING OPPORTUNITIES

Here is your opportunity to join Ryder Truck Rental, Inc., leaders in the transportation industry. We have a large scale computer/telecommunications system (370/168, DB/DC, IMS/VS). We are seeking qualified individuals in the following capacities:

PROJECT MANAGER - COMPUTER OPERATIONS

Minimum 5 years' experience in data processing. The successful candidate must have a college degree and experience in the following areas:

* Computer Operations, Operations Support, Applications Programming, OS Systems Programming.
* Project control and management of large number of concurrent widely diversed activities.
* Ability to relate to all levels of management and provide meaningful/concise status reports.
* A broad understanding of IBM 370/168 architecture and software.
* Ability to supervise and coordinate the activities of 15 DP professionals.

OPERATIONS PRODUCTION TECHNICAL SUPPORT

Requires 2 years' experience. Assist in the installation and maintenance of S/370 software packages. Must have working knowledge of the following as related to the support of computer operations: HASP or JES2, OS/JCL, background in performing studies and projects, and knowledge of debugging and performance evaluation tools (i.e. SMF).

PROGRAMMERS/ANALYSTS

Minimum 2 years' experience using COBOL and OS/JCL in large IBM systems environment. Knowledge of on-line systems, 3270 CRT's TSO, IMS, and a college degree all desirable.

MICROFILM/COM ANALYST

Must have sound experience in this area. Programming experience helpful. Will take full charge of total project.

If you feel you possess the background to join a successful professional team and desire an atmosphere of challenge and latitude to express your ideas in a growing MIS operation, please send resume to:

RYDER

Barbara Edwards, Personnel Manager-MIS
RYDER TRUCK RENTAL, INC.
2850 Tigertail Avenue
Miami, Florida 33133

"We are an Equal Opportunity Employer M/F"

SENIOR SYSTEMS ANALYST

Progressive, growing industry in a pleasant midwestern town has a challenging opportunity for a senior analyst with a minimum of five years indepth experience in a manufacturing environment. This position provides opportunity for imagination and innovation in Data Base Management, DBOMP and MRP. If you have experience in the above, plus proven project leadership capabilities, submit resume to Charles Jones.

Union Steel Products

500 North Berrien St., Albion, Michigan 49224
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We are an acknowledged pacesetter in process plant automation and energy control systems. Increasing demand for on-line real-time advanced automation systems has created opportunities at Bailey for the following

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Will have project budget responsibility and manage the development of a distributed complex of microprocessor based computers and large central computers used for plant information and process control in nuclear power plants.

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Responsibilities in the following areas: design, document and debug firmware for interface between a distributed multiplexer and memory of high performance computer; firmware for intelligent ports to a file oriented bulk memory system; a microassembler for above tasks.

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Design, document and debug a microprogrammed interface between the communications link of a distributed multiplexer and the memory of a high performance digital computer; an intelligent bulk memory system; an I/O Bus Switch; Colorgraphic Display generator interface.

SENIOR ENGINEER

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SENIOR ENGINEER

Development of data acquisition software for a distributed microprocessor based process monitoring system.

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Interviews will be held in New York in the near future Please forward details of experience and telephone numbers for contact to:

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responsibilities include coordinating and participating in installation of computer hardware and software, troubleshooting computer operating system problems and multi-vendor hardware problems. Knowledge of HASP 4 or MVS and JES2 required. Currently running SVS; will be converting to MVS.

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involves analysis and design of T/P software systems, writing specifications, and participating in implementation. Minimum six years ADP experience including strong background in IBM's S/370 VS2 or MVS ALC programming, TCAM Programming and Design, TCAM Control and Flow, Programmable Communication Controllers, Asynchronous and Synchronous Line Protocols.

Send Resume to:

Assoc. of American Railroads
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EDP

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Dr. John M. Tyler, Director
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Metropolitan Dade County
Data Processing Division
1351 NW 12 St, Room 908
Miami, Florida 33125
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For more information, send your resume, with salary history, to **Mr. Chuck Zeleny, Manager of Employee Relations, Dept. CW, Datapoint Corporation, 9725 Datapoint Drive, San Antonio, Texas 78284**

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Responsible for management of personnel and work of University Gift Records Office; analysis, design, maintenance and development in COBOL for computer systems and programs of offices of development and alumni affairs. Prepare progress, status, statistical reports, and analysis and presentation of materials. Maintain current working knowledge of pertinent advances in computer field. Accounting, on-line, and mass mailing application experience helpful. Qualifications: 2-4 years college plus 3-6 years programming and systems analysis experience, or equivalent combination of education, training and experience. Fringe benefits excellent. Salary commensurate with experience. Send resume to Box 57V, Waterman Building, University of Vermont, Burlington, Vermont 05401.

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Send resume and letter stating objectives to: Marilyn Kay, Personnel Director

TRC

125 Silas Deane Highway
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PROGRAMMER/ ANALYSTS

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- **Firmware**
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DALLAS
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Stemmons Tower West
Dallas, Texas 75207

DETROIT
Electronic Systems Personnel
1705 Fisher Building
Detroit, Michigan 48202

FLORIDA
Data Sciences Personnel, Inc
Suite 205, 15490 N.W. 7th Ave
Miami, Florida 33169

HARTFORD
Compass, Inc
900 Asylum Avenue
Hartford, Connecticut 06105

LOS ANGELES
Constellation Enterprises
Suite 900, 3250 Wilshire Blvd
Los Angeles, California 90010

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New York, New York 1001[illegible]

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P.O. Box 6888
Greensboro, N. Carolina 27405

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Systems Personnel
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Wallingford, Pa. 19086

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Electronic Systems Personnel
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428 Forbes Avenue
Pittsburgh, Pennsylvania 15219

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The Computer Resources Group Agency, Inc
303 Sacramento Street
San Francisco, California 94111

SYRACUSE
CFA Associates Personnel, Inc (Agency)
2530 James Street
Syracuse, New York 13206

TULSA
Data Processing Careers, Inc
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2626 East 21st Street
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- JES 3
- VSAM
- TSO/TCAM

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Like customer contact? Amdahl needs:

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CSC

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- Data base management
- Real-time scientific applications
- Network management
- Computer-to-computer communications
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Staffing Department
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System Sciences Division
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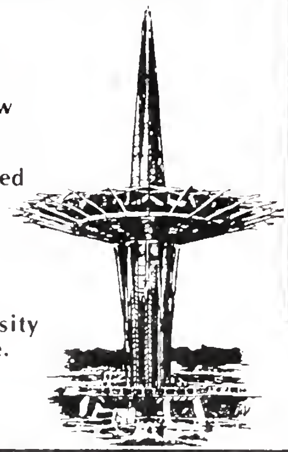

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Three or more years required in programming and design. Financial and manufacturing applications experience is a plus. Must be ready and willing to accept responsibility and leadership.

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Director of Corporate Personnel
UNISTRUT CORPORATION
A Subsidiary of GTE Sylvania
35005 Michigan Avenue, W.
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GTE SYLVANIA UNISTRUT CORPORATION

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Management Consultants
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We feel these taks can best be performed by someone who has had some experience in system performance evaluation and transaction processing systems. Knowledge of, or work with; synthetic benchmarks, data processing systems and system performance instrumentation would be an asset.

Employee will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employee and dependents. Generous relocation allowance.

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To qualify, you should have IBM systems 360/370 hardware support experience plus thorough knowledge of IBM CPU diagnostic usage. Working knowledge of IBM CPU diagnostic usage. Working knowledge of software and/or training helpful.

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Minimum of three years experience in IBM Operating System software (OS-VS2) in a medium or large system environment. IMS, VTAM, SDLC, CICS, and MVS experience is preferred.

PROGRAMMERS

Minimum of two years programming experience in COBOL or BAL in an IBM 360/370 environment. CICS, IMS/DL-1 experience and a Bachelors Degree in Mathematics, Engineering or Business are preferred.

ENGINEERING PROGRAMMERS

Assembly language programmers with Real-Time Data Acquisition experience. Two years' experience and Electrical Engineering Degree or equivalent preferred.

IMMEDIATE OPENINGS

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Mr. A. M. Strickland
Florida Power & Light Company
P.O. Box 013100
Miami, Florida 33101
or may arrange for a local interview by calling Mr. Strickland at 305/552-3994.

AN EQUAL OPPORTUNITY EMPLOYER M/F

SYSTEMS LIBRARIAN HARVARD UNIVERSITY LIBRARY

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Philip E. Leinbach
Harvard University Library
Cambridge, Mass. 02138

EQUAL OPPORTUNITY AFFIRMATIVE ACTION EMPLOYER

DIRECTOR OF COMPUTER SERVICES

Regional educational administrative data processing cooperative is seeking qualified candidates for the executive officer's position of the cooperative. An advanced degree in computer science, educational administration, or related field plus experience in administration is desirable. Position will start September 1, 1977 or as soon as possible thereafter. Cooperative will be relocating in Mankato, Minnesota in January 1978. Applications sould be received no later than July 22, 1977 and should include resume with three references. Salary is $22,000+ per year dependent upon qualifications. For further information call (507) 289-6105. Send applications to:

John E. Odom
ESV Region V
Computer Services Cooperative
334 16th St.
S.E., Rochester, Minn. 55901

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Prog Anal COBOL/ALC	$16-18K
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EDP DIVISION
JIM KING
438 Gulf Life Tower
Jacksonville, FL 32207

Database Experience

Ætna Life & Casualty is looking for an experienced data processing analyst/supervisor to assume a key role in the development of a Group Pension coverage database system. Assignment will be on project team which has full responsibility for all development but is limited in database experience. EDP environment is experienced large scale development department.

Applicants should demonstrate proven ability in all aspects of sophisticated database development, implementation, and operation with emphasis on advanced DBMS and DD/D. Applicants should also demonstrate two + years of experience in IBM large scale OS/VS, COBOL, systems design (preferably structured), and program design. Other helpful attributes include, JCL, timesharing, assembler, good verbal and written communication skills, user rapport, and results oriented.

Nice people, good location and free parking. Excellent package of benefits. Send resume and salary history to Joe H. Golson, Employment Office, Ætna Life & Casualty, 79 Farmington Ave., Hartford CT 06156. An equal opportunity employer.

Ætna LIFE & CASUALTY

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field engineering

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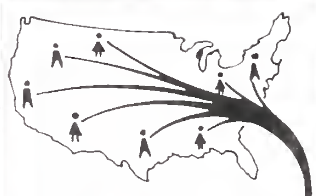

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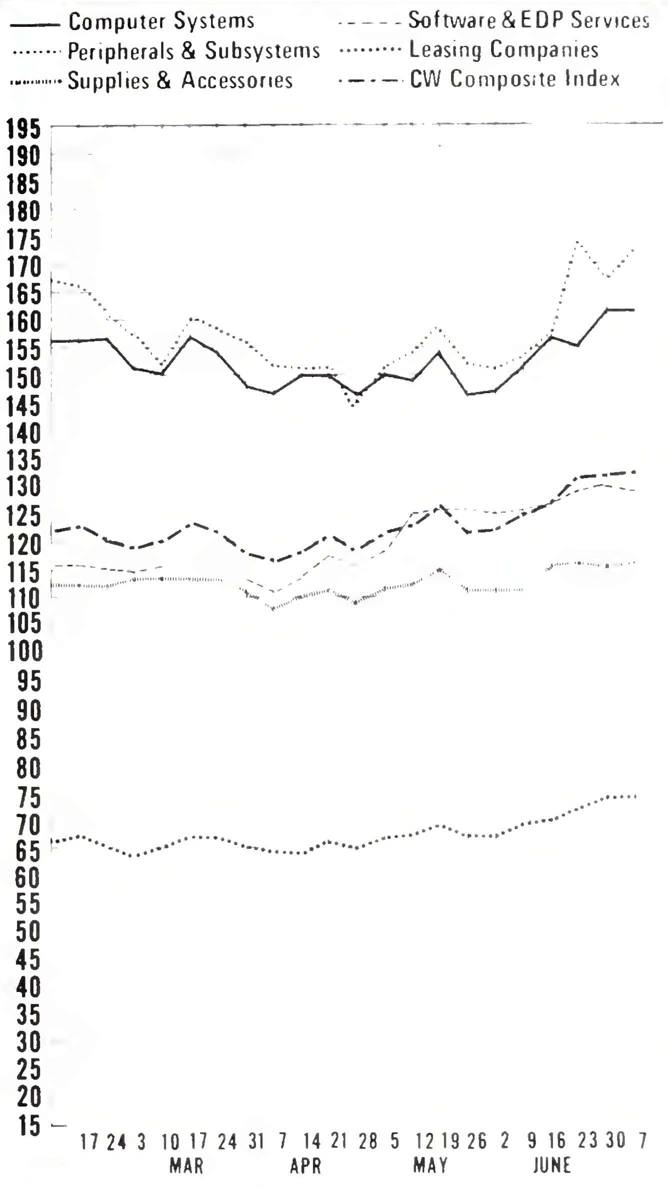
COMPUTERWORLD Computer Stocks Trading Indexes



Earnings Reports

COMTEN
Three Months Ended April 1

	1977	1976
Shr Ernd	$ 16	$ 05
Revenue	7 175 000	5 390,000
Tax Cred	118,000	40,000
Earnings	407,000	127,000

DIGICON
Three Months Ended April 30

	1977	1976
Shr Ernd	$ 07	
Revenue	5 977,000	$5 409 000
Earnings	151 000	(546 000)
9 Mo Shr		03
Revenue	17 339 000	19 188 000
Tax Cred		61 000
Earnings	(140,000)	53,000

DIGITAL EQUIPMENT
Three Months Ended April 2

	1977	1976
Shr Ernd	$ 72	a$ 51
Revenue	282 727,000	191 234 000
Earnings	27 991 000	18 922,000
9 Mo Shr	1 73	a1 28
Revenue	728 269 000	504 293 000
Earnings	67 392,000	46 586 000

a-Adjusted to reflect three-for-one stock split in November 1976

EG&G
Three Months Ended April 3

	1977	1976
Shr Ernd	$ 30	$ 23
Revenue	81 955,000	49 975 000
Earnings	2 136 000	1 638,000

a-Restated

FAIRCHILD CAMERA AND INSTRUMENT
Three Months Ended April 3

	1977	1976
Shr Ernd	$ 41	$ 04
Revenue	117,103,000	96,616 000
Earnings	2 229,000	197,000

ELECTRONIC MEMORIES & MAGNETICS
Three Months Ended April 2

	1977	1976
Shr Ernd	$ 13	$ 02
Revenue	23,364,000	20,842,000
Earnings	984,000	394 000

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TRADE*QUOTES.

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JULY 6, 1977

All data compiled, computed and formatted by TRADE*QUOTES, INC Cambridge, Mass 02139

COMPUTER SYSTEMS

EXCH		PRICE 1977 RANGE (1)	CLOSE JULY 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMDAHL CORP	0- 39	26 1/4	+ 1/4	+0.9
N	BURROUGHS CORP	55- 91	61 3/8	- 1/4	-0.4
O	COMPUTER AUTOMATION	18- 28	26 1/2	+ 1/2	+1.9
N	CONTROL DATA CORP	20- 26	20 7/8	- 5/8	-2.9
N	DATA GENERAL CORP	35- 47	44 1/4	-1 1/8	-2.4
N	DATAPOINT CORP	18- 30	25 1/4	-1 3/4	-6.4
N	DIGITAL EQUIPMENT	37- 53	45 3/8	-1 7/8	-3.9
N	ELECTRONIC ASSOC.	2- 3	2	0	0.0
A	ELECTRONIC ENGINEER.	8- 10	8 1/2	+ 1/4	+3.0
O	FOUR-PHASE SYSTEMS	13- 17	15 3/8	0	0.0
N	FOXBORO	42- 54	50 3/8	- 1/4	-0.4
O	GENERAL AUTOMATION	6- 9	7 5/8	+ 5/8	+8.9
O	GRI COMPUTER CORP	1- 1	5/8	0	0.0
N	HEWLETT-PACKARD CO	69- 87	79 1/8	+ 3/8	+0.4
N	HONEYWELL INC	44- 55	53 3/4	- 1/8	-0.2
N	IBM	245-286	259 7/8	-5 3/8	-2.0
O	MANAGEMENT ASSIST	5- 9	6 1/8	- 1/4	-3.9
C	MEMOREX	23- 29	25 3/8	+1 1/4	+5.1
O	MICRODATA CORP	7- 18	9 1/4	- 1/4	-2.6
C	MODULAR COMPUTER SYS	5- 8	7 1/2	- 1/8	-1.6
N	NCR	32- 38	36 3/4	- 1/8	-0.3
O	PRIME COMPUTER INC	12- 17	16	+ 1/4	+1.5
N	PERKIN-ELMER	17- 22	20 7/8	+ 1/4	+1.2
N	RAYTHEON CO	16- 33	30	- 5/8	-2.0
N	SPERRY RAND	34- 42	36 1/8	- 7/8	-2.3
C	SYCOR INC	6- 15	10 3/4	0	0.0
A	SYSTEMS ENG. LABS	5- 7	7 1/4	+1 1/4	+20.8
N	VARIAN ASSOCIATES	15- 21	19	-1 1/4	-6.1
A	WANG LABS.	14- 18	16 3/4	- 1/4	-1.4

LEASING COMPANIES

EXCH		PRICE 1977 RANGE (1)	CLOSE JULY 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
C	BOOTHE COURIER CORP	8- 10	9 1/4	0	0.0
O	COMDISCO INC	10- 13	10 1/4	+ 1/4	+2.5
A	COMMERCE GROUP CORP	2- 2	2	- 1/8	-5.8
A	COMPUTER INVSTRS GRP	1- 2	7/8	0	0.0
M	DATRONIC RENTAL	1- 2	1	0	0.0
A	DCL INC	1- 2	2	+ 1/8	+6.6
N	DPF INC	6- 8	7 7/8	+ 1/8	+1.6
N	ITEL	13- 20	19 3/4	+2	+11.2
N	LEASCO CORP	19- 24	22 3/4	0	0.0
O	LEASPAC CORP	1- 2	1	+ 1/8	+14.2
C	NRG INC	0- 0	1/8	0	0.0
A	PIONEER TEX CORP	5- 11	5 3/4	+ 1/8	+2.2
N	U.S. LEASING	10- 14	13 7/8	0	0.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
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SOFTWARE & EDP SERVICES

EXCH		PRICE 1977 RANGE (1)	CLOSE JULY 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/4	0	0.0
C	ANACOMP INC	7- 9	8 7/8	0	0.0
A	APPLIED DATA RES.	5- 9	9	0	0.0
N	AUTOMATIC DATA PROC	23- 30	28	- 1/2	-1.7
C	COLEMAN AMERICAN COS	2- 2	1 3/4	- 1/8	-6.6
O	COMPU-SERV NETWORK	10- 15	12 1/2	0	0.0
C	COMP ELECTION SYSTMS	6- 9	9 1/4	+ 1/8	+1.3
C	COMPUTER HORIZONS	1- 1	1	- 1/4	-20.0
O	COMPUTER NETWORK	6- 7	6 3/8	+ 1/2	+8.5
N	COMPUTER SCIENCES	7- 9	8 1/8	+ 1/4	+3.1
C	COMPUTER TASK GROUP	1- 2	1 1/4	- 3/4	-37.5
C	COMPUTER USAGE	2- 3	1 1/2	- 1/8	-7.6
C	COMSHARE	5- 7	5 1/2	+ 3/4	+15.7
O	DATA DIMENSIONS INC	4- 5	3 1/2	- 1/8	-3.4
C	DATATAB	1- 2	1 7/8	0	0.0
N	ELECTRONIC DATA SYS.	16- 20	19 1/2	0	0.0
C	INSYTE CORP	2- 3	1 7/8	0	0.0
C	IPS COMPUTER MARKET.	1- 2	1 1/2	0	0.0
O	KEANE ASSOCIATES	3- 4	3 3/8	- 1/4	-6.8
C	KEYDATA CORP	2- 3	2	0	0.0
A	LOGICON	7- 17	17	- 1/4	-1.4
A	MANAGEMENT DATA	1- 2	1 1/2	+ 1/4	+20.0
A	NATIONAL CSS INC	19- 25	21 7/8	+ 7/8	+4.1
O	NATIONAL DATA CORP	4- 7	5 1/8	- 1/8	-2.[illegible]
A	ON LINE SYSTEMS INC	17- 22	19	- 1/8	-0.6
N	PLANNING RESEARCH	3- 5	4 1/2	+ 1/4	+5.8
C	PROGRAMMING & SYS	1- 1	5/8	0	0.0
C	RAPIDATA INC	2- 3	2 1/2	+ 1/4	+11.1
O	REYNOLDS & REYNOLDS	17- 20	19 1/4	+ 1/2	+2.6
C	SCIENTIFIC COMPUTERS	1- 3	3 1/8	+ 1/8	+4.1
C	TYMSHARE INC	14- 21	20 1/2	+1 3/4	+9.3
A	UFS SYSTEMS	4- 5	4 1/2	0	0.0
N	WYLY CORP	1- 2	1 1/8	- 1/8	-10.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1977 RANGE (1)	CLOSE JULY 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 15	14 1/8	- 1/4	-1.7
O	ADVANCED MEMORY SYS	7- 9	8 5/8	+ 5/8	+7.8
N	AMPEX CORP	8- 10	10 1/4	0	0.0
L	ANDERSON JACOBSON	3- 4	4	+ 1/4	+6.6
N	APPLIED DIG DATA SYS	10- 16	13 1/2	- 3/4	-5.2
C	BEEHIVE INT'L	8- 12	9 1/2	+ 1/8	+1.3
A	BOLT,BERANEK & NEW	7- 8	6 3/4	- 1/8	-1.6
N	BUNKER-RAMO	8- 12	10 1/8	- 1/8	-1.2
A	CALCOMP	3- 5	3 1/8	+ 1/8	+4.1
C	CAMBRIDGE MEMORIES	1- 3	2 5/8	+ 3/8	+16.7
N	CENTRONICS DATA COMP	22- 29	26 3/4	+ 1/8	+0.4
C	CODNITRONICS	1- 1	1/2	- 1/8	-20.0
C	COMPUTER COMMUN.	5- 6	6 5/8	+ 1/4	+3.9
C	COMPUTER CONSOLES	4- 7	5 1/2	- 1/2	-8.3
A	COMPUTER EQUIPMENT	2- 3	3 1/4	0	0.0
C	COMPUTER TRANSCEIVER	1- 1	1	0	0.0
O	COMTEN	9- 13	11 1/4	- 1/2	-4.2
N	CONRAC CORP	19- 28	23 1/8	- 3/8	-1.5
[illegible]	DATA ACCESS SYSTEMS	4- 5	4	0	0.0
O	DATA 100	6- [illegible]	7 1/2	+ 3/4	+11.1
A	DATA PRODUCTS CORP	9- 13	12 [illegible]	[illegible]	0.0
[illegible]	DATA TECHNOLOGY	3- 4	4	0	0.0
[illegible]	DATUM INC	1- [illegible]	1 1/2	- 1/8	-7.6
O	DECISION DATA COMPUT	2- [illegible]	2 3/4	+ 1/8	+5.5
[illegible]	DELTA DATA SYSTEMS	[illegible]	3/4	[illegible]	0.0
[illegible]	ELECTRONIC M & M	4- 5	4 1/8	+ 3/8	+10.0
[illegible]	FABRI-TEK	1- [illegible]	1 1/8	- [illegible]	-5.3
O	GENERAL COMPUTER SYS	[illegible]	1 3/8	[illegible]	0.0
N	HAZELTINE CORP	[illegible]	[illegible]	- 1/8	-1.2
N	HARRIS CORP	[illegible]	37 1/8	+ 1 1/4	+3.6
A	INCOTERM CORP	11- 15	11 1/2	- 1/4	[illegible].1
O	INFOREX INC	[illegible]	[illegible] 1 1/4	+ 3/4	+16.6
[illegible]	INFORMATI[illegible] INTL [illegible]	[illegible]- 15	13 1/2	+1 1/4	+13.5
O	INTEL CORP	[illegible]	[illegible]	- 1/2	-1.0
A	LUNDY ELECTRONICS	[illegible]	[illegible]	+ 3/4	+17.1
[illegible]	MSI DATA CORP	[illegible]- 10	9 1/2	+ 1/8	+1.3
N	MOHAWK DATA SCI	5- 8	[illegible]	- 1/4	-4.4
[illegible]	[illegible]	2- 5	4 1/2	+ 1/8	+2.8
A	PERTEC CORP	[illegible]	[illegible] 1/4	- 1/8	-[illegible].4
A	POTTER INSTRUMENT	[illegible]	1 3/4	0	0.0
O	PRECISION INST.	[illegible]	1 1/2	0	0.0
[illegible]	QUANTOR CORP	4- [illegible]	3 5/8	- 1/4	-6.4
[illegible]	RECOGNITION EQUIP	6- 10	[illegible] 5/8	+ 1/8	+1.4
[illegible]	SCAN DATA	1- [illegible]	1 5/8	+ [illegible]	+3.9
[illegible]	STORAGE TECHNOLOGY	10- 15	1[illegible] 7/8	-1 3/4	-11.9
[illegible]	[illegible]-BAR INC	7- 11	1[illegible]	+ 1/2	+4.8
[illegible]	TALLY CORP.	4- 6	4	- 1/8	-[illegible].0
[illegible]	TEC INC	7- 10	[illegible] 3/4	- 1/8	-1.4
[illegible]	TEKTRONIX INC	2[illegible]- 36	3[illegible] 3/4	+ 3/4	+2.1
[illegible]	TELEX	[illegible]- 3	2 5/8	- 1/4	-[illegible].6
[illegible]	WILTEK INC	[illegible]- 1	1/[illegible]	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1977 RANGE (1)	CLOSE JULY 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	[illegible]- 4	1 3/4	[illegible]	0.0
A	BARRY WRIGHT	10- 14	13 1/8	[illegible]	-0.9
O	CYBERMATICS INC	1- 1	5/8	[illegible]	0.0
O	DUPLEX PRODUCTS INC	14- 18	16 3/4	0	0.0
N	ENNIS BUS. FORMS	[illegible]- 7	6 1/8	- 1/8	-2.0
[illegible]	GRAHAM MAGNETICS	11- 15	14 3/4	[illegible]	[illegible]
O	GRAPHIC CONTROLS	15- 18	16 1/2	0	0.0
N	3M COMPANY	48- 56	49 1/2	-1 1/8	-2.2
O	MOORE CORP LTD	29- [illegible]	[illegible] 1/2	+ 1/4	+0.8
N	NASHUA CORP	16- [illegible]	[illegible]	+1 1/4	+6.0
[illegible]	STANDARD REGISTER	18- 25	22 1/4	- 1/4	-1.1
O	TAB PRODUCTS CO	13- 17	16 1/4	+ 1/4	+1.5
N	UARCO	19- [illegible]	20 1/4	0	0.0
A	WABASH MAGNETICS	10- 15	13 7/8	- 1/8	-0.9
N	WALLACE BUS FORMS	17- 21	18 1/8	+ 3/8	+2.1

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